SKYWAYS

Pilot's Report...
3-Control Ercoupe

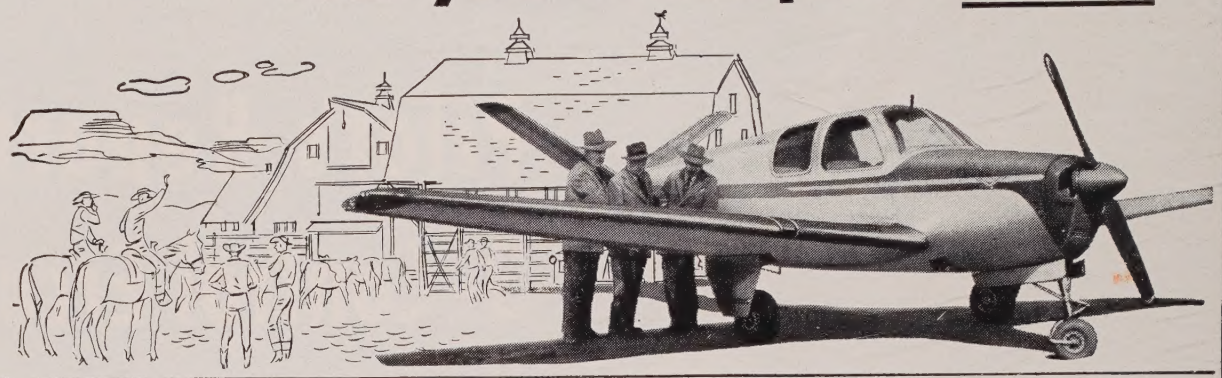
page 14

eyknight
ighter, *page 12*

ow Roll It! page 20

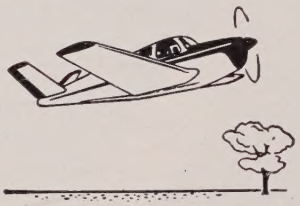
SEPT. 1950 25¢

On the go? This Beechcraft lets you accomplish more!



Speed and Top Performance

Because you cruise at 170 mph, all the travel time you formerly wasted is put to *profitable* use. You measure trips in hours, not days. The Bonanza's 750-mile range gives you mobility of action.

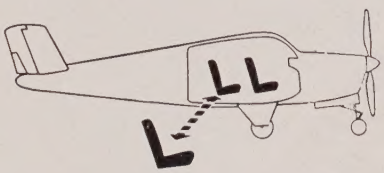


Short Field Performance

. . . because of these features: Take-off horsepower rating now 196 hp at 2450 rpm. New Beechcraft propeller has greater static thrust. Action of retractable landing gear has been speeded up.

Solid In-Flight Comfort

Luxuriously appointed cabin carries four with plenty of "stretching room." Quiet soundproofed cabin lets you arrive ready for action. Luxury touches: arm rests, ash trays for all, three map pockets.

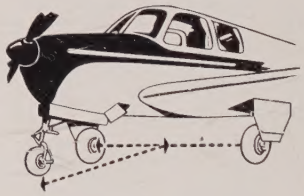


Extra Space When Needed

Want more cargo space? Rear seats are easily removable in 3 minutes. Regular luggage compartment accessible from inside or out. There's even a cabin coat hanger rod to carry clothes wrinkle-free.

"Passenger Car" Economy

Since the Bonanza uses only 56% of the engine's rated take-off horsepower, there's less engine strain, fewer overhauls. And upkeep is exceptionally low. You use only 9½ gallons of fuel per hour.



It's *Strong* on Safety

Sturdy, low cross-braced landing gear with its wide tread and long wheel base makes rough field landings easy. Rugged all-steel frame far surpasses shock and stress requirement tests of CAA.

There's much more to tell about this versatile, economical business plane. For the full story on the revolutionary Model B35 Beechcraft Bonanza, contact your nearest Beechcraft distributor or dealer. Or for more details, write Beech Aircraft Corporation, Wichita, Kansas, U.S.A., on your company letterhead today.

Top speed, 184 mph
Cruising speed, 170 mph
Range, 750 miles
Fuel economy, 9.5 gph

Beechcraft
BONANZA

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

...You'll find more and more alert airports selling CITIES SERVICE products

CITIES SERVICE

A top line of petroleum products and services is a big plus for any airport. That's why you'll see more and more of the famous green and white emblems of Cities Service proudly displayed at airports in all parts of the country.

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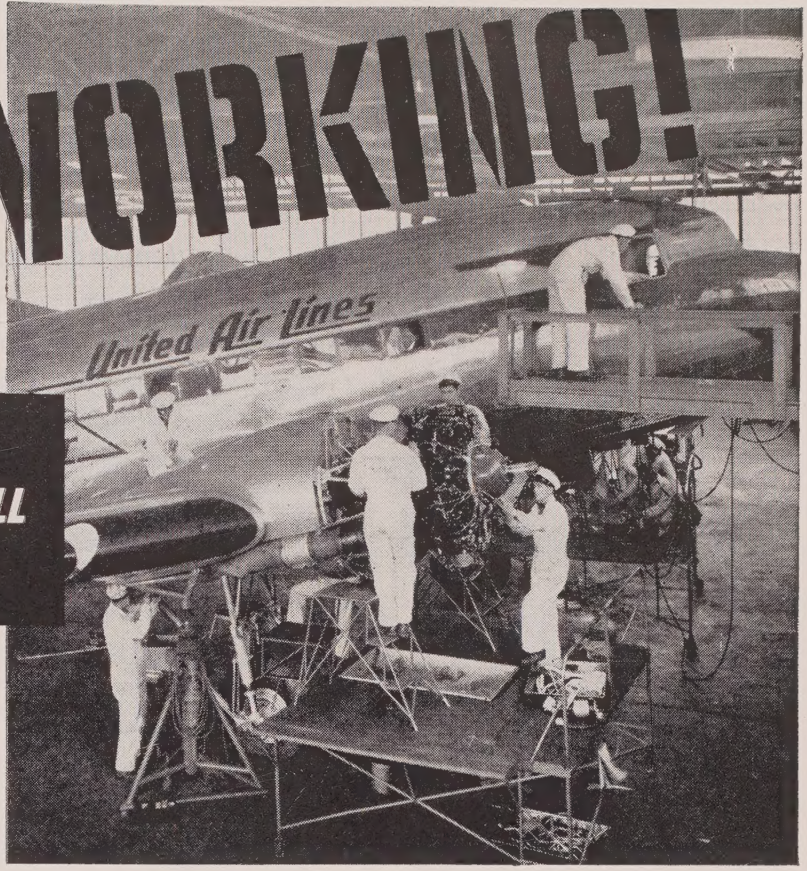
MEN WORKING!



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The New Spartan Multi-Engine Maintenance Mechanic and Flight Engineer Course fills a serious need by supplying men of increased training and knowledge of the operation of large, complex aircraft. Write for Special Folder!

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SKYWAYS

Cover: Douglas Skyrocket — *September, 1950*

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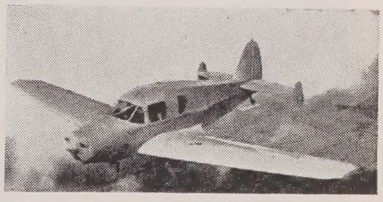
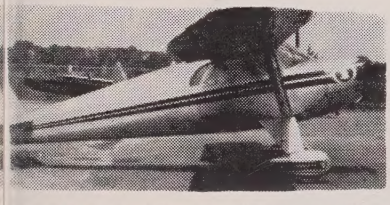
WIDGEON AMPHIBIANS — 14 FOR SALE—Model G-44, #9236HS, has 40 hours since major overhaul. Curtiss metal propellers. New glass, cables, brakes, and tires. Leather upholstery. Engines 140 hours. Blind instruments. Two radios, 1 VHF. Loop. Exceptional. $7300. Make offer. Consult **POWERS & GEORGE.**

SWIFT 125's—22 FOR SALE—$1675 UP. Globe, #3566KS, has 142 hours. Aeromatic. Primary blind. Radio. Relicensed. Hangared. $1950. Make offer. Also, 1948 Temco, #3175KS, with auxiliary tank. 148 hours. Aeromatic. Primary blind with gyro compass. Radio. Bargain. $2250. Consult **POWERS & GEORGE.**

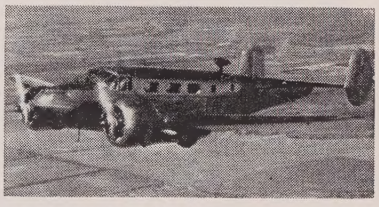


BELLANCAS—17 FOR SALE—$2675 UP. 1947. #77433S, has 210 total hours. Small tail fins. Outside baggage door. Aeromatic. Two-way radio. Very clean. All bulletins. January license. Hangared. Excellent at $3250. For details, inspection, and demonstration consult **POWERS & GEORGE.**

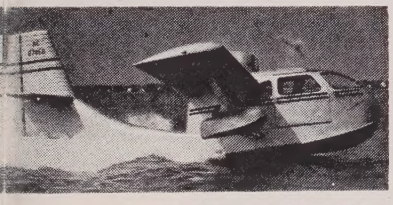


[illegible]COMBE 8E's & 8F's—21 FOR SALE—Late 1948 all metal model 8E, #1723BS, has 150 total hours. 85 HP engine. Metal propeller. Recording tachometer. Lear receiver. Cabin heater. Relicensed March. All bulletins. $1500. For details, location, and inspection, consult **POWERS & GEORGE.**

DOUGLAS DC-3 EXECUTIVES—3 FOR SALE—#7844OS has 50 hours since completely overhauled. Best airline instruments and radio with ship to shore telephone. Beautiful interior. Three 4-place divans and five chairs. Relicensed. A plush transport in new condition. $54,000. Consult **POWERS & GEORGE.**

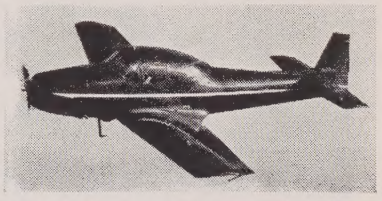


BEECHCRAFT TWINS—27 FOR SALE —$16,250 UP. Late 1947 D18S, #23DS, has beautiful executive interior. 3-place couch and 3 chairs. Hydromatic props. Nose tank. Airline instruments and radio. Ship to shore telephone. Special soundproofing. No corrosion. $32,000. Consult **POWERS & GEORGE.**

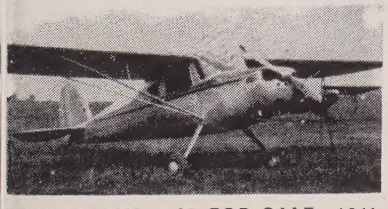


SEABEE AMPHIBIANS—34 FOR SALE —#6763KS, serial #711, has 105 total hours. No corrosion. Excellent. All bulletins. $1700. Also, #6782KS, serial #751. 150 hours. Steerable tailwheel. Stainless cables. Painted silver. All improvements. Relicensed. $2225. Consult **POWERS & GEORGE.**

BONANZAS—44 FOR SALE—$5500 UP. 1948 model A-35, #606BS, has 250 total hours. Primary blind instruments with special compass. Sun visors. Two radios, one VHF. Omni-range. Marker beacon. Hangared. May license. Exceptional. $8000. Offer wanted. Consult **POWERS & GEORGE.**



NAVIONS—45 FOR SALE—$3850 UP. April 1949 Ryan, #4165KS, is green and cream. 155 total hours. 205 HP engine. Latest type propeller. Full blind panel. Radio. Airplane repainted and relicensed in February. New condition. Reasonably priced at $8700. Consult **POWERS & GEORGE.**



CESSNA 140's—61 FOR SALE—1946, #76095S, has 200 hours. New propeller and tires. Primary blind group. Radio. Hangared. All bulletins. Relicensed. $1000. Also, 1947, #49S, with 350 hours. Metal propeller. Primary blind instruments. Radio. Jump seat. Hangared. $1350. Consult **POWERS & GEORGE.**

1948 STINSONS—20 FOR SALE— $2300 UP. #6491MS has 262 total hours. New metal propeller. Primary blind instruments. Directional gyro. Manifold pressure. Two radios. 7 channel VHF transmitter. Marker beacon. Hangared. Beautiful. $3425. Make offer. Consult **POWERS & GEORGE.**

AERONCA SEDANS—5 FOR SALE— $2950 UP. #1308HS, has only been flown 76 hours. Metal propeller. Primary blind instruments. Two-way radio. Reglo finish. Relicensed. Always hangared. Never damaged. New condition. Asking $3150. Make offer. For further particulars consult **POWERS & GEORGE.**

ALL TYPES OF AIRPLANES AVAILABLE—DETAILS UPON REQUEST—LISTINGS SOLICITED

First in All-Weather Defense

AIR YOUR VIEWS

Flashing Lights

Gentlemen:
In your July issue of "Seth's Safety Quiz": a flashing red light means to clear the landing area, not to 'taxi back to the hangar line'—which is a flashing white. Right?

R. C. MACKALL
Ass't Airport Mgr.

Dayton Municipal
Vandalia, Ohio

Not according to our "Air Traffic Control Procedure" chapter in the Pilot's Handbook. It reads, "Aircraft on the Airport: When a pilot is taxiing, a series of red flashes from a directed traffic control light will mean, 'Taxi back to hangar line'!" A red light means "clear the runway and wait," when pilot is in take-off spot. —ED.

Pay Off

Gentlemen:
I was particularly interested in the article "Air Photos Pay Off," by H. J. Burrows, in the May issue. The piece impressed me as being well written and complete in every detail. My friends and I believe more articles of this type, showing how to put your flying experience to practical use, should appear in aviation magazines.

JAMES J. DAVITT, JR.

California

Thank YOU, Mr. Davitt . . . watch for more articles from Mr. Burrows. He's hard at work on them for us 'cause we like them, too.—ED.

Paging Coast Guard

Gentlemen:
Have particularly noticed you have many articles about all military aircraft and the CAP, but have never seen any article about the little-known U. S. Coast Guard Aviation Branch. Once in awhile I've noticed a small article hidden down in the corner of a newspaper, telling about some daring rescue 300 miles out on a rough sea, saving the lives of many. Understand the Coast Guard is the oldest force of all our armed forces. Seems to me you could do a bang-up job telling subscribers about some of the exciting activities of the Aviation Branch of the Coast Guard.

S. R. EDDY

Mgr. Eddy Company
Plantsville, Conn.

Right you are . . . there's no finer nor more important branch of the armed services than the Coast Guard. We'll do it . . . get that article, that is.—ED.

Plane Queries

Gentlemen:
Could you please tell me why there isn't much said about the Spartan *Executive?* Would also appreciate information concerning this airplane and word as to whom I should write for specific details.

R. E. ANDERSON

Anchorage, Alaska

The Spartan Executive *was in production at Spartan Aircraft during 1938, 39, 40 and 41. It is not on the market today, except as used aircraft, and was to have been succeeded by a new "executive" airplane designed and built by Spartan after the war. Apparently those plans were cancelled, at least for the time being. The Spartan set-up today is Spartan Aero Repair (new name for Spartan Aircraft) and though the company has been reorganized, it still retains an interest in the postwar version of the* Executive, *but the ship is not in production. Write Spartan Aero Repair at the Municipal Airport, Tulsa, Oklahoma.*—ED.

Special Missions

Gentlemen:
M/Sgt. Moriarity, who takes the rap for his article "Special Missions, USAFE," states "pilots like the B-17 for its sentimental value." Bunk. They like its fool-proof emergency systems in case of hydraulic failure. I know. They know the ship will stand a two-turn spin. I know. The ship is good to the crew. My chest hardware is a testimonial to that. Generals like the ship for the same reasons. I hauled Gen. MacArthur out of the Philippines, no GCA, also no beams, no nothing. We were lucky to operate off a field where even landing strip lights were installed.

I lived in and with B-17's from 1940 to 1945, opened the war at 2500 feet over Hickam Field on the 7th, then went on to the real blitz with the 19th Bomb Group . . . "Suzy Q," "Swoose," etc. There are a lot of us around with good memories.

H. M. WHEATLEY

Los Angeles, Calif.

Thanks, Wheatley, for your letter and also for a job well done. Guess you're like another fellow in this office . . . every time he sees a picture of a B-17, he gets that far-away-remember-those-bachelor-days look in his eye.—ED.

Gentlemen:
In your last April issue, you gave a list of 30 planes, with photos and figures. Among those planes pictured was one known as the Meyers *Mac.* I would like to know where that plane is built and how to reach the manufacturer.

A. J. REBER

Battle Creek, Mich.

Write to the Meyers Aircraft Company at Tecumseh, Michigan.—ED.

Gentlemen:
I believe a great number of private, commercial and airline pilots would appreciate your running a Pilot's Report on the Aero-Flight *Streak.*

N. L. DOBSON

Hull, Quebec, Canada

The Aero-Flight Streak *has not been made available as yet for a pilot's report. According to our reporter on the West Coast, the 125-hp* Streak *was stacked up and the company is now rebuilding the 90-hp version according to all CAA specifications. Actually, the plane is still on the drawing boards and will not be flying until sometime this fall.*—ED.

F8F Engine

Gentlemen:
In your April "X-Country" page you state the F8F carried a 2500 Pratt & Whitney engine. I think the F8F carries a 2800-32W powerplant.

PFC. J. COOLEY

Memphis, Tenn.

According to word we received from pilot of that particular plane (F8F-2), it was powered by 2500-hp (maximum) Pratt & Whitney R-2800-E engine. Does that make us both right?—ED.

Where Are They?

Gentlemen:
Will you please tell me whether or not the following planes ever went into production:
Internat'l Aviation "Duckling," Kaiser "Aircar," Waco "Aristocrat," and Puget Pacific "Wheelair."

E. W. SLANINGER

Austin, Texas

Answer seems to be "No," in all cases.—ED.

MILITARY AVIATION

SPECIAL MISSION B-45 Latest version of the four-jet North American B-45 bomber recently was announced by the AF. Designated the RB-45C, it is a long-range high-speed, high-altitude photo reconnaissance bomber powered by four GE J-47A jet engines. Special duty scheduled for the new RB-45C includes day and night reconnaissance at high or low altitudes, charting, mapping and photographing terrain and installation areas. In the 550-mph class, the *Tornado* has added power available for take-off by use of alcohol-water injection with jet engines.

X-4 RESEARCH The USAF and the National Advisory Committee for Aeronautics have launched a long-range research program with the latest of the famous "X" series of experimental aircraft, the Northrop X-4. NACA test pilot John H. Griffith has been assigned to conduct the research flight program.

EXTERNAL TANKS FOR F-86 Greater combat range and increased maneuverability of the F-86 *Sabre* is the result of the development of new external gas tanks. Designed to fit the aerodynamic contour of the *Sabre*, these "banana-shaped" combat tanks cause less drag than the larger ferry tanks previously used. The *Sabre* has averaged 710 mph on operational Air Force flights, but it can streak through the sky at an even higher rate of speed without external tanks. Airflow over the newly designed tanks, however, is so much like the flow over the *Sabre's* sweptback wings that there is little reduction in the plane's top speed. These new combat tanks are now being installed on all *Sabres* coming off North American assembly lines, and earlier models will be refitted with them.

RB-50B SUPERFORTRESS The Air Force's first completely modified RB-50B "Superfort" was delivered recently by Boeing Airplane Co. A multi-purpose bomber, the "Superfort" is extensively equipped as a photographic plane, a weather reconnaissance ship, and as a normal bomber. It has four camera stations, nine cameras as a photo ship, intricate recording equipment for weather reconnaissance, and latest radar installations.

PIPER LIAISON Piper Aircraft's entry in the Army liaison plane competition was the PA-19 powered by 125-hp Lycoming engine. Its performance is said to be better than its civilian counterpart, the Piper PA-18 *Super Cub* which can take off and land shorter than any airplane currently in production and which can fly as slow as 33 mph with a light load in still air. Main difference between the 19 and the 18 are the 125-hp engine and such cockpit-design changes as plexiglas top and rear to afford maximum visibility, and space aft for radio, tactical and navigational equipment. The new PA-19 can carry six hours of gasoline, two 200-pound crew members (including 'chutes), 40 pounds of radio and 60 pounds of miscellaneous equipment.

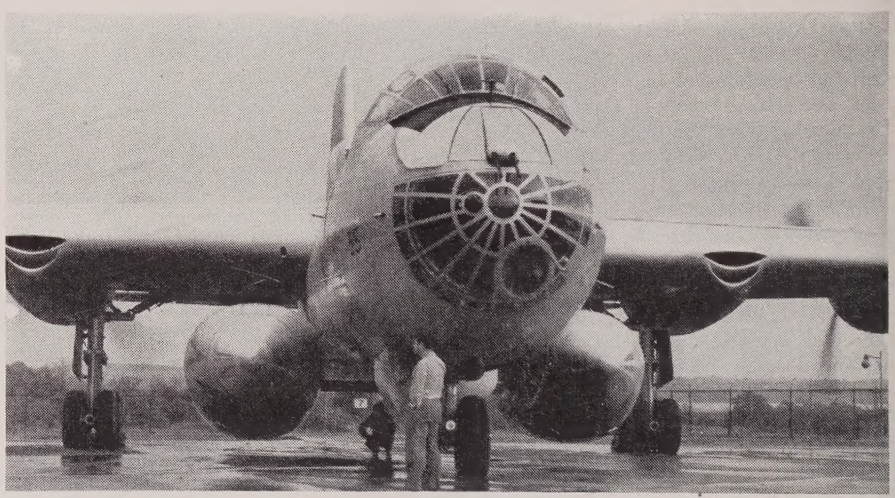
NAVAL AIR TRAINING Vice Admiral John Dale Price, former Vice Chief of Naval Operations, has relieved Vice Admiral John W. "Black Jack" Reeves as Chief of Naval Air Training. Admiral Reeves retired recently, and has since been appointed general manager of the Los Angeles Department of Airports.

DOUGLAS C-124A Service tests have begun on the mammoth Douglas C-124A transport at Wright Field following delivery of the first production model to the USAF Air Materiel Command. The plane will be flown under simulated service conditions. The heavy-duty C-124 carries up to 50,000 pounds of payload under normal operating conditions, is powered by four Pratt & Whitney R-4360 engines with water injection, delivering 3500-take-off horsepower each, has range of more than 2,200 miles with 50,000-pound payload.

LUSCOMBE T-8F-L Another military liaison plane entered in the Army competition was the Luscombe *Observer*, a two-place high-wing tandem monoplane powered by 90-hp Continental injector engine. Fully controlled flight can be maintained at speeds under 40 mph, and the power-on stall with flaps is at 35 mph. It can carry seven hours of fuel, two crew members with full equipment, 40 pounds of radio equipment and 60 pounds of miscellaneous equipment.

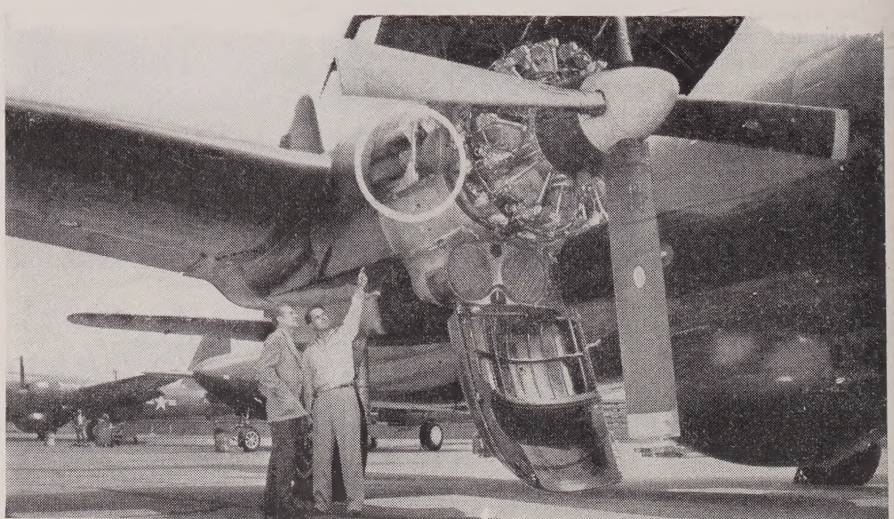
ZERO READERS North American Aviation has ordered Sperry Zero Readers for installation in the F-95A, all-weather version of the jet *Sabre*. The Zero Reader will enable the F-95 pilot to make approaches at lower weather minimums on beam landing systems such as ILS.

NORTHROP TURBODYNE Called the most powerful prop-type aircraft powerplant in the world, the Northrop XT-37 Turbodyne recently completed its official 50-hour endurance proving program. This engine has delivered more than 10,000 horsepower in tests, and has set a record by delivering 7500 horsepower continuously over long intervals of time. Within 30 minutes of its installation on the stand, the XT-37 was delivering 7500 horsepower without any of the tedious "running in" ordinarily necessary in powerplants of this type. According to present research, this type engine will extend ranges over that now possible with pure jet.



USAF B-36 has its own engine nacelle carrier suspended from bomb racks. With it, the B-36 can carry four spare powerplants

COMPOUND engine gives P2V more than 3200 hp. Three small gas turbines (circle, below) harness exhaust gas for extra power



VERSATILITY FOR *Strategic* AIRLIFT

Strategic airlift requires "around-the-clock" movement of critical cargo and personnel in large quantities to a given area. Full utilization of planes and space, plus the capacity to load and unload with timetable regularity—these are the essentials for success in such operations.

The Fairchild C-119 is designed to meet the rigorous demands of strategic airlift missions. Capable of carrying a 9 ton pay-load for 2000 miles, its huge fuselage handles bulk items with ease. Rapid loading and unloading of cargo is readily accomplished through the huge rear loading doors and the truck-bed height of the squared fuselage—features designed to do the job.

Built to perform multiple assignments, C-119's can deliver mobile hospitals, aircraft engines and spare parts, machine shops and maintenance personnel—a vast variety of strategic items—when and where they're needed.

Little wonder the C-119, another Fairchild "first" in air transportability, sets the standard for VERSATILITY in modern aircraft design.

ENGINE AND AIRPLANE CORPORATION

FAIRCHILD *Aircraft Division*

HAGERSTOWN, MARYLAND

Air Report on the FAR EAST

FIFTH AIR FORCE standard fighter is the Lockheed F-80C. These *(above)* roar over the cone of Mt. Fujiyama in Japan

SACRED SYMBOL of Japan, Mt. Fujiyama just 60 miles SE of Tokyo, now has become a symbol of our Far East Air Force

MORALE BOOST was given airmen of Fifth Air Force when Gen. Hoyt S. Vandenberg made tour of AF installations

MILITARY future of Fifth Air Force may rest in 'copters as troop carriers. This one demonstrates rescue

FAR EAST air power includes B-29 *Superfortresses* based on Okinawa and Guam, under control of FEAF Hq. in Tokyo

MUSTANGS now based in Japan are being replaced by jets. The few still there go on daily fighter patrol missions

By MARTIN CAIDIN

HISTORY is being written today in the skies over Japan. There the United States has based a powerful, tactical air unit—the Fifth Air Force. Our future role in the Far East, and our ability to *remain* in the Far East, will depend in great part upon the combat prowess of this air arm.

The Fifth Air Force has heavy responsibility: maintaining air control of Japan, providing air defense of the Japanese home islands and surrounding (*Continued on page 41*)

Any pilot with 10 hours training and common sense can fly the Skyknight

By RUSSELL W. THAW

Test Pilot, Douglas Aircraft

I'D BE glad to solo anyone with 10 hours training—and an ounce of common sense—in the Navy's new *Skyknight.*

It's that simple to fly!

After 24 years of flying for a living, I've flown a lot of airplanes, but this new *Skyknight* beats them all. It's such an honest airplane that you almost forget you're flying a big, rough-and-tough night fighter.

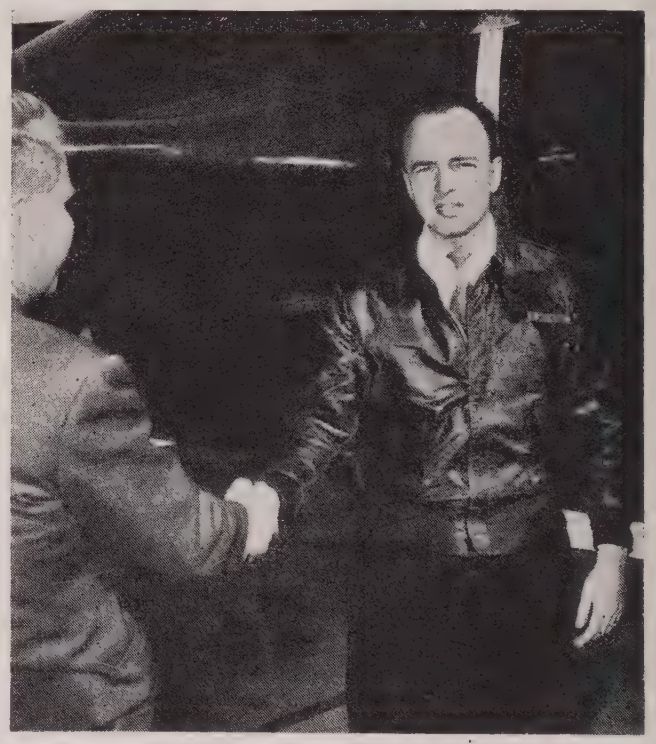
The *Skyknight* is a conventional twin-jet, carrier-based plane that will double-in-brass as an attack-fighter, long-range patrol reconnaissance plane or as a fighter-escort. It has radar equipment under its blunt nose, but security regulations at this writing prohibit the plane's weights, sizes, and speeds.

For the past two years I've practically lived with this airplane. The first flights of the F3D were made at Edwards AFB at Muroc—30 minutes on the first uneventful hop—and two days later we were back in the air on the first evaluation tests.

We worked up to maximum speed in easy 10- to 15-mph steps. The early tests were basically on stability and control. We checked the controls carefully for over-balance as speed was increased.

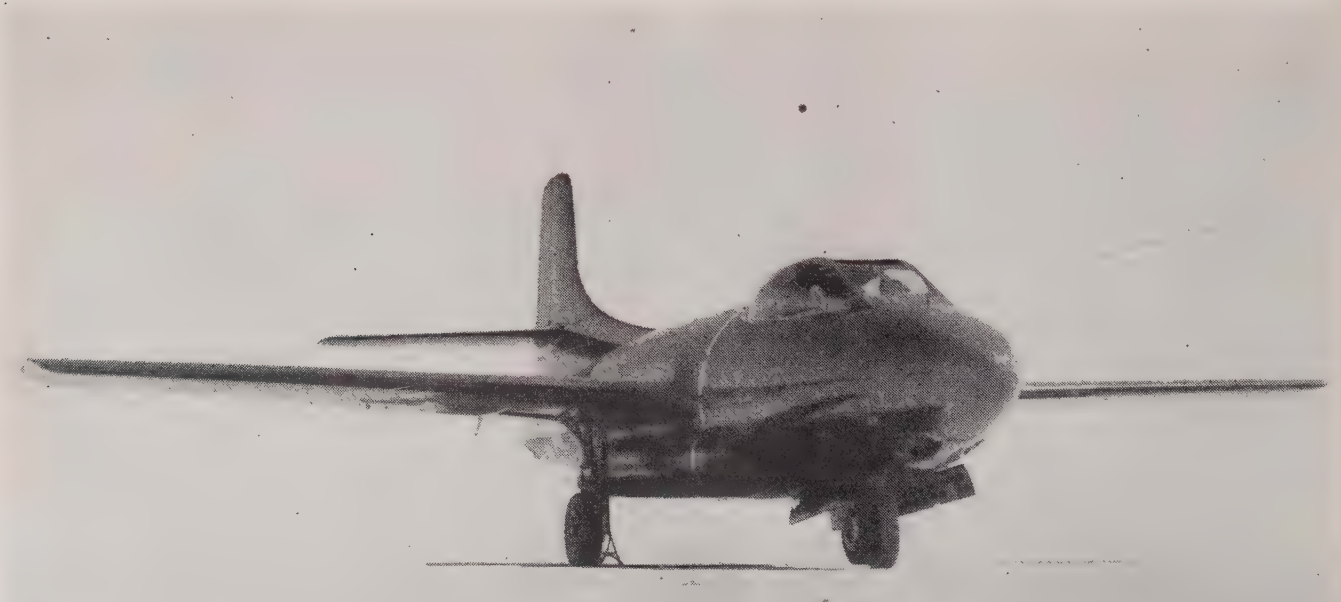
The engineering department prophesized the ship would make a certain speed. But in those tests it went faster than that, all of which made project engineer Harry Nichols and the aerodynamics group

TEST PILOT Russ Thaw made the first flights in the new Douglas *Skyknight.* The first hop lasted only 30 minutes



PILOT-AUTHOR Thaw is former airline pilot. He did some air racing, then in 1940 did test flying for Curtiss

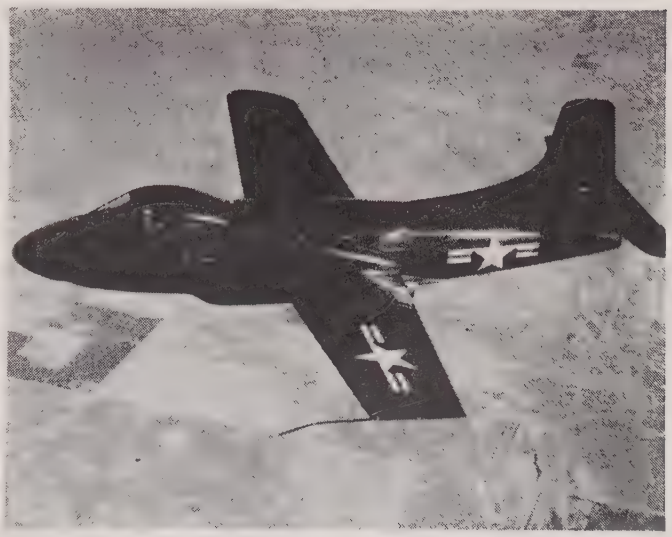
NAVY SKYKNIGHT is a twin-jet, carrier-based plane that is to double-in-brass as an attack fighter, patrol plane



Skyknight Rider

FUEL TANKS of the F3D are inside fuselage above the engines. The plane's powerplants are Westinghouse J-34's

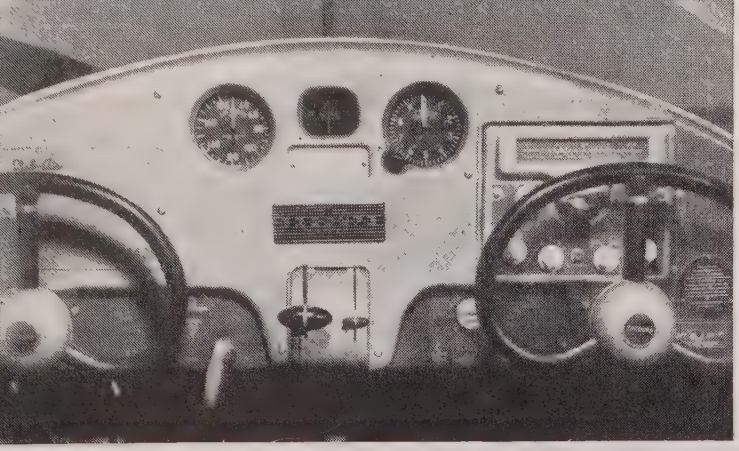
SIDE-BY-SIDE seating arrangement in F3D does not limit pilot-copilot or radarman conversation to an intercom



of the company's El Segundo plant very happy.

Next in the development program came the structural flight tests. "Can the airplane take it?" asked the Navy. We made level flight pull-outs and rolling pull-outs at required load factors for fighters. Negative load factors were obtained from inverted flight. That way you're at minus-1 G, and you flip the stick forward when you're at the right speed until your accelerometer shows you've applied enough force. You know you've been through the wringer when you finish this one.

I use a G-suit on flights that require violent maneuvers. This pressure suit fits like a girl's nylons and is inflated automatically by compressed air. A pressure valve increases the (*Continued on page 38*)



INSTRUMENT PANEL has standard flight and engine gages, allows for the installation of additional flight instruments

The Ercoupe for 1950 is available in two versions: regular two-control model or the standard three-control

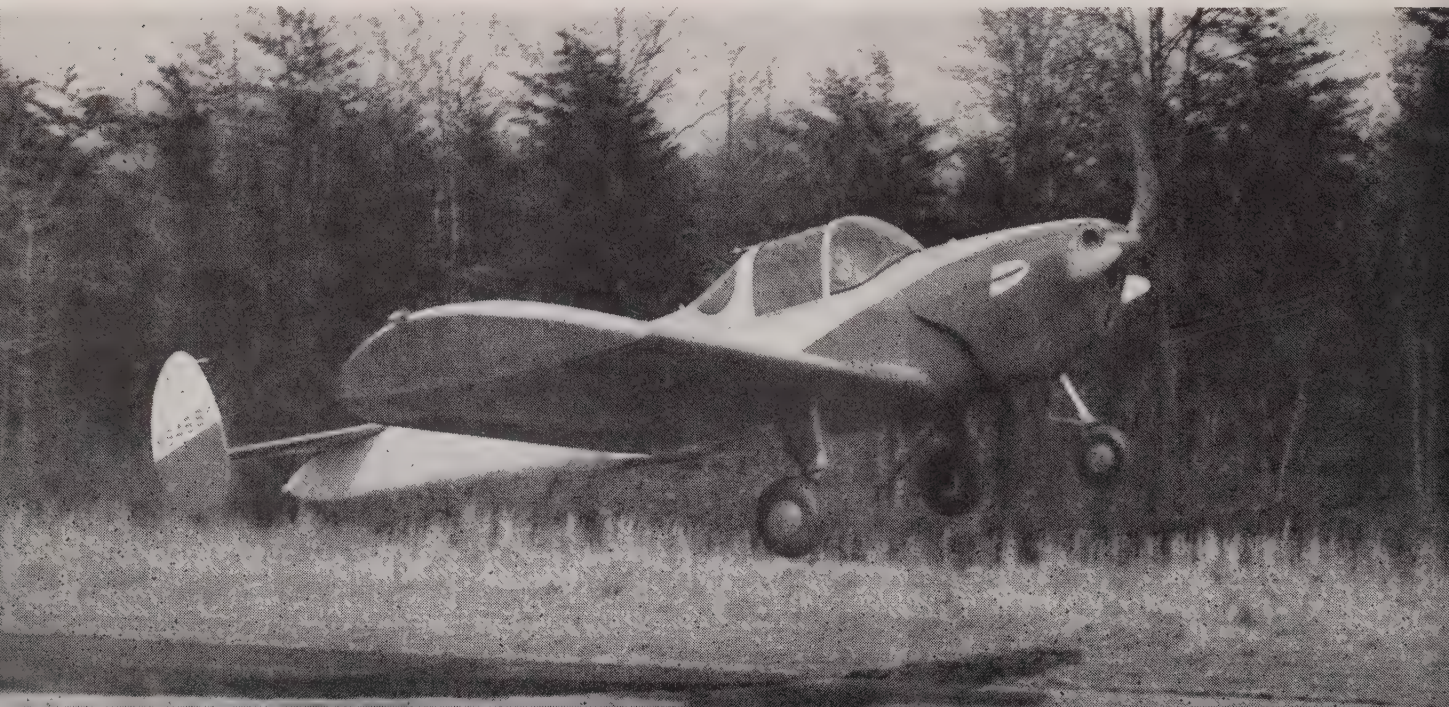
Pilot's Report... New Ercoupe

ENGINE COWLING can be held open by metal arm. No more will cowling come clunking down on the A & E's noggin

By A. H. HASBROOK

Anyone who's ever had a hankering for an Ercoupe with rudder pedals and three control instead of the former two can now have his wish. Sanders Aviation, sole distributors of this spin-proof plane, are now producing a new three-control version of the 1950 Ercoupe in addition to the older two-control design. This addition should not only interest those who have liked previous Ercoupe models but should also nullify the objections of some fixed-base operators who have shied away from using these low-wing airplanes for training because of the "limitation" of two control.

TAKE-OFF in the *Club-Air* was accomplished in 12 seconds from a standing start and crosswind. One minute 58 seconds later, the ship was at an altitude of 1,000 feet, its climb averaging out at 500 fpm at 65 mph at 2175 rpm



FEATURE of the new Ercoupe is an appealing paint job. The *Club-Air*, either two- or three-control models, is available in a two-tone blue or a two-tone green. In near future, there will be red-and-green combination

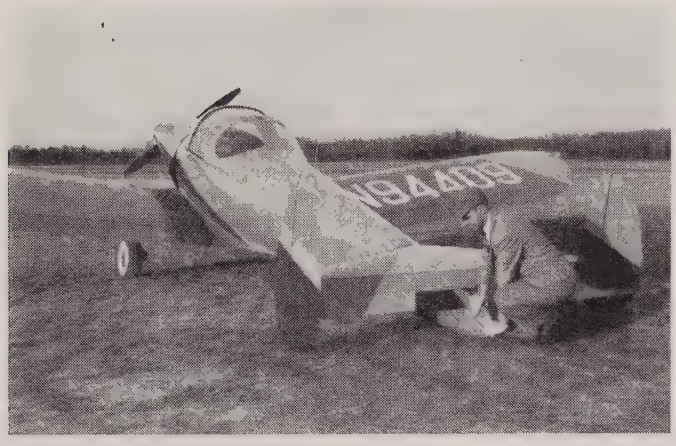
What's more, a rudder kit soon will be made available to anyone who wants to convert his older two-control model to three control. The kit price will be somewhere around $150.

Although the two- and three-control 1950 models, designated *Club-Air*, are essentially one and the same airplane, improvements have been engineered into both which are noteworthy and show a definite reaction to customer desire. These were brought to our attention by Joe Redding, Director of Sales and Service, during our recent visit to Riverdale, Maryland to flight check the new Ercoupe and report our findings to the readers of SKYWAYS.

The most obvious improvements, at first glance, is the appealing new color scheme with diagonal demarcation lines running from the top of the engine cowl on down the sides of the fuselage; on the fins and rudders; and on the wing tips. A two-tone blue and a two-tone green are standard color schemes. In the near future there (*Continued on next page*)

CRUISING SPEED of the *Club-Air* is between 110 and 113 mph at 2400 rpm at 2,000 feet. Author got an easy 110

STANDARD TIRE on the Ercoupe is 500 x 5 tire. For rough or soft fields, a 600 x 6 tire and wheel assembly is available. Another change in Ercoupe is the cut-away elevator *(below)* that reduces its over-all area

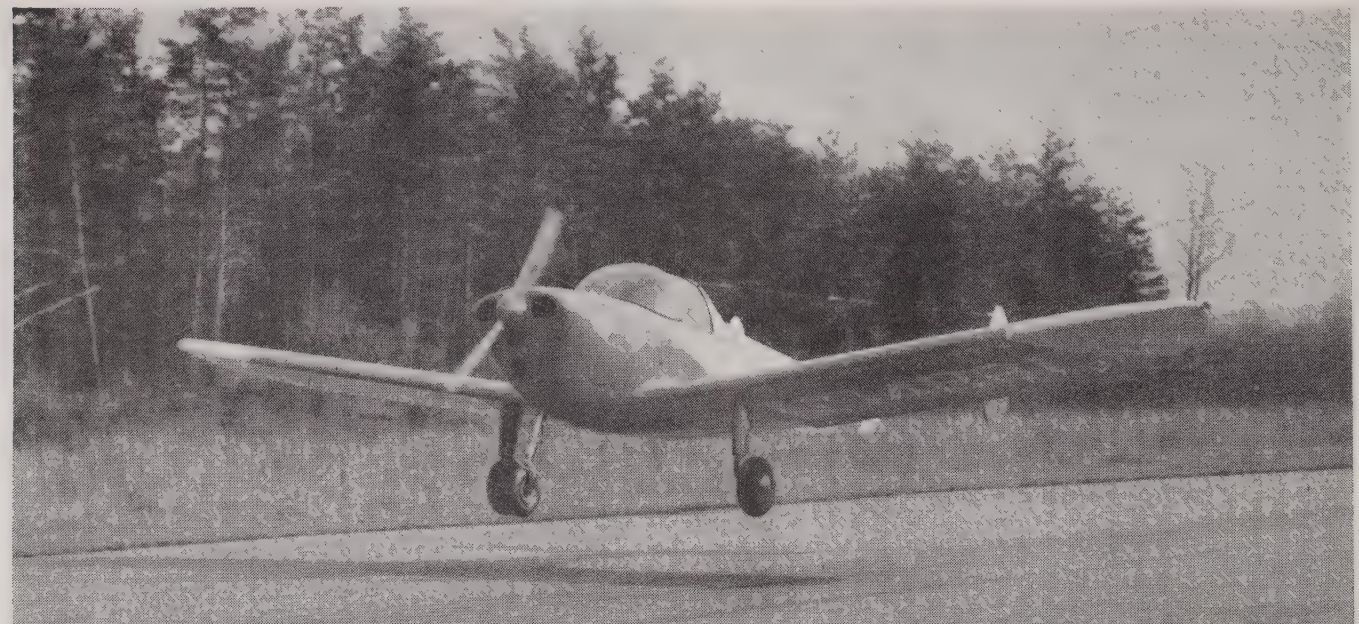


will also be a red-and-cream combination. Aside from adding materially to the appearance, this lacquer paint job aids in protecting the plane surface from "weather." Also improving the appearance of the airplane is a new Lucite bubble-type, one-piece windshield which increases the already excellent visability and eliminates water leaks when flying in rain. Another external change is the redesigned elevator, cut partially away in the center to reduce its over-all area. The result of this change (in combination with an increase in "up" travel of 7°) has provided a control which gives less change in trim between full power and no power, with the elevators up any specified amount. This is most noticeable with the elevators full up where the difference in trim speed, power-on or power-off, is only two or three miles per hour, instead of about eight with the elevator. It also reduces yaw effect in rough air and increases the airplanes resistance to being slow rolled. Probably the most important result of this change, however, is the slower landing speed (approximately 5 mph less) due to the fact that the tail now can be dropped down lower than was previously possible with the older models. Too, the "V" cutaway in the elevator makes it relatively easy to push the tail down by hand when moving the ship around in the hangar.

Walking around this neat, "almost" all-metal airplane (its wings are fabric covered), Mr. Redding directed our attention to the new radio antenna installation . . . . a "V" affair with the wires separating at the top rear of the cabin and running back to the top rear of the vertical fins. In this position they're completely out of the way when the pilot and passenger enter or leave this ship. Another improvement is a controllable cabin cold-air vent, screen covered, which is located in the face of the engine cowl where it can draw clean, cool air from the prop wash both while flying and on the ground. This in combination with the hot-air control (both control knobs are located close together at the right of the instrument panel) permits the occupants to select varying amounts of warm and cold air to "air condition" the cockpit at will. During this SKYWAYS' flight check, made at very-low-for-summer temperatures, the available hot air was quite sufficient to maintain inside cabin temperatures at a comfortable level.

Using a dime to open *(Continued on page 40)*

PILOT-AUTHOR Hasbrook came in over field boundary at 65 mph, then at that point began his flare-out, wheel way back



CANYON CAPER

PILOT KOUNALIS, shown here with CAP Lt. Marion Church, talks over his memorable flight in bottom of a canyon

By A. KOUNALIS

You can't buy anything in the bottom of a canyon 'cept trouble. Everyone is supposed to know better than to start up the bottom of a river bed in a low-powered airplane, but it seems that once in a while you need a jolt to jog your memory.

Nowadays if the air is too rough for flying, I either slow down and take my beating like a man or I land and wait things out. No more canyon refuge for me.

It was a charter trip and I was flying my passenger from the front seat of a tandem *Cub* trainer. We left Vernal, Utah, for Dove Creek, Colorado, a sou'sou'east course against sou'sou'west winds that were viciously turbulent on a hot muggy day. As I crossed the Colorado River canyon a few miles north of Moab, Utah, the wide, broad valley of the Rio Dolores spread before me, leading me almost on course to my destination.

The headwinds had cut my groundspeed and I was beginning to worry about gas consumption. Twenty-five hundred feet below, in the Dolores valley, I saw a plume of smoke rising almost vertically. I concluded that the plateaus and high mountains southward had broken down the airflow so that there was relatively little wind in the valley basin. With plenty of room in the canyon's mouth to maneuver, I let down into the Dolores valley and found the air much better at 500 feet.

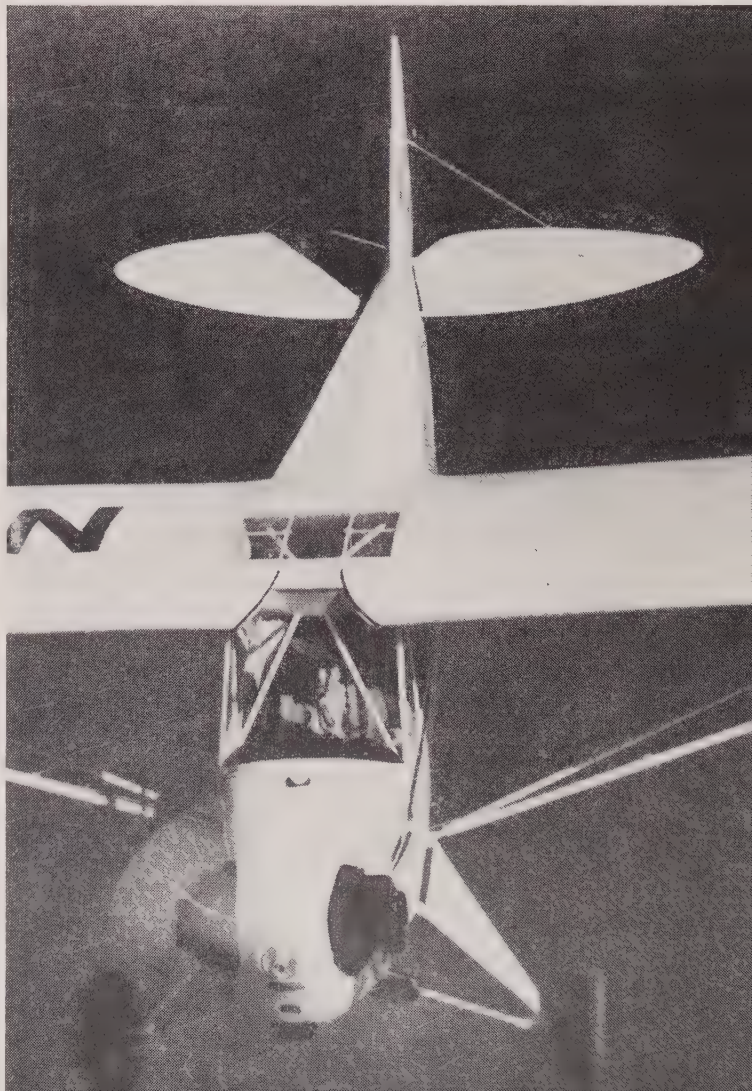
Up ahead the valley turned into a steep-walled canyon, but at my altitude the canyon was plenty wide enough for extensive maneuvering in the versatile *Cub*. Groundspeed picked up almost 20 mph which made the gas situation all okay, and the air was a lot smoother.

For about five minutes I figured I was a pretty sharp operator.

We aerial-ambled easily, taking a little loss here, gaining a bit there. When we came to an adjoining canyon where air was pouring in off a reef, I swung left a bit and put the throttle clear ahead just in case there was a "sinker" in the offing.

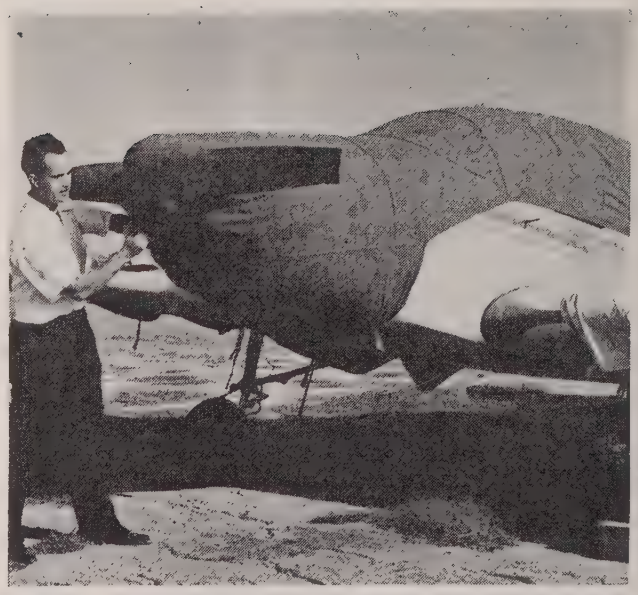
What I got was a blast (*Continued on page 49*)

CHARTER TRIP from Vernal, Utah to Dove Creek, Colorado was made in a *Cub*, with the pilot riding the front seat



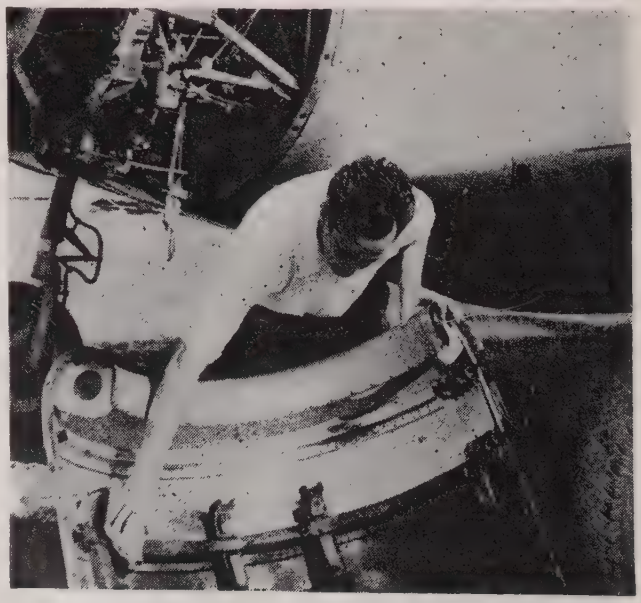
TIE-DOWN TRACES

By GILBERT C. CLOSE



BELLANCA owner fits engine, cockpit cover over his airplane. Cover here is too tight for long-period protection

TIED-DOWN AIRPLANES are a common sight at all airports Owners of these planes *(above)* must pay particular attention to maintenance and, like this owner *(right)*, must keep surfaces oil free. Oil is a great dust collector



THIS is the story of 50,000 airplanes without a home, and what the owners of these airplanes can do about it. It's a story that began several years ago when "Hangar for Rent" signs disappeared from airport bulletin boards to be replaced by the now familiar "Tie-Down Space Available" notices. It is the story of gremlins that lurk in the great outdoors, waiting to put the hex sign on airplanes without hangar walls and roofs to protect them.

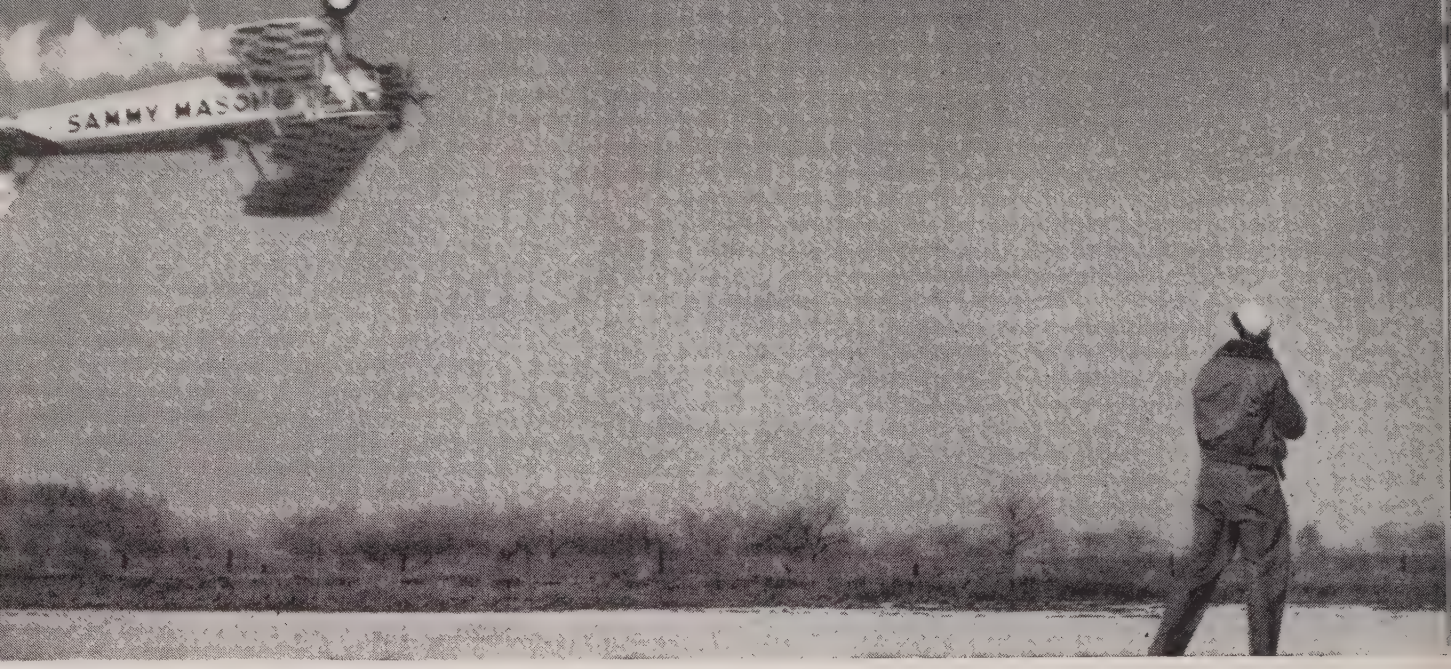
You see these homeless airplanes on every airport, tied down in neat, long rows, gleaming multicolored in the sunlight. It gives you a lift just to see

WEATHER gnaws at an airplane that is tied-down outdoors over long periods of time. Thus the operator of a plane-without-a-home must check and double-check his ship. An improvised cockpit cover *(right)* will help keep cowling

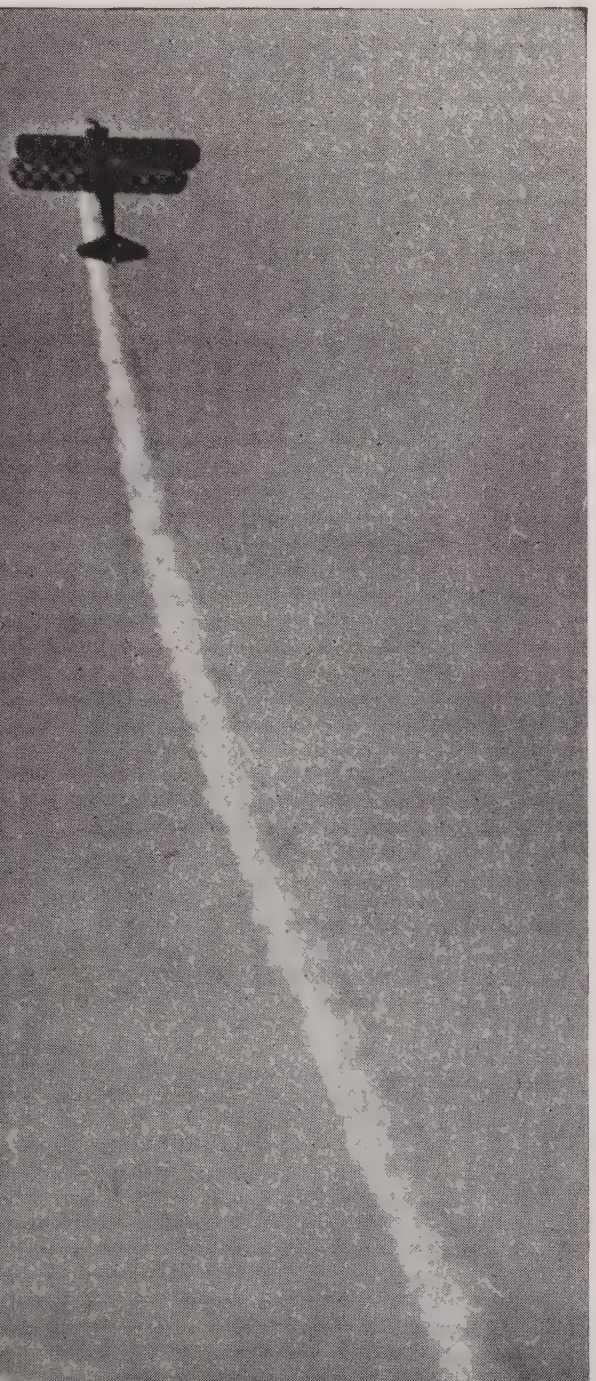
them, for they are a true emblem of air-minded America. But if you are an airplane owner or an aircraft mechanic, the sight leaves a queasy feeling in the pit of your stomach. You know, better than anyone else, that tie-down storage of airplanes introduces new and vastly magnified maintenance problems.

The current shortage of hangar space is acute, and there is little reason to believe the situation will soon be better. Labor costs and material prices continue to soar. New hangars built under these conditions would demand an ex- (*Continued on page 39*)

FLYING FARMERS usually own Tee-hangars, but some tether their ships in fields where weather gremlins do the work



AEROBATIC FLYER Sammy Mason buzzes the Tri-City Airport near San Bernadino (Calif.) in an inverted position. According to Mason, aerobatics instill confidence in flying, the confidence a student needs to improve technique and make him a better pilot



Slow Roll It!

By SAMMY MASON

as told to Don Downie

Learn acrobatics to improve your flying technique, not to show off as a "hot" pilot and wring-out your friends.

Some pilots are mentally unsuited to fly acrobatics. These are the immature "fly-boys" who go out on their own in lightplanes completely unstressed for rolling around, and build up the accident reports.

Acrobatic training is one of the marks of a fully experienced pilot. No other type of practice will instill the confi-

PILOT-AUTHOR Mason is pictured here in front of his 450-hp Stearman with checkered wings

dence in flying that a pilot learns from rolling over on his back and looking up at the world.

When I teach acrobatics, I start with my own students at 15 or 20 hours and throw in a simple loop or two. Often this serves as a shot-in-the-arm to make him snap out of the slump that every student has shortly after solo. The students like the idea, too.

Acrobatic training always makes better pilots. After a few dual sessions on unusual flight positions, a student pilot has a good idea what happens in an accelerated (high-speed) stall. He knows how much altitude his airplane will lose when he makes a "split S" following a poor slow-roll. He gets over that feeling of dis-orientation (*Continued on page 22*)

PLANE CHOICE for Sammy Mason is the Stearman PT-17. Its rugged biplane construction and plenty of aileron area make it an easy-going aerobatic airplane. Maneuverability of the plane is demonstrated *(above left)* in Mason's inverted drag of the field

MASON goes up and over in a climbing slow roll. Full aileron in the direction of the roll is used all the way

when he is riding his safety belt upside-down, and he's all through worrying about turbulent weather that might roll him over on his back.

Acrobatics are like riding a bicycle. You can't learn how to do them by reading a book or a magazine—but you can pick up a good many pointers that will make your actual training come quickly. I've found that the student who asks for acrobatic instruction seldom gets into trouble. It's the know-it-all type who won't take instruction from anyone that usually gets in trouble with his acrobatic flying.

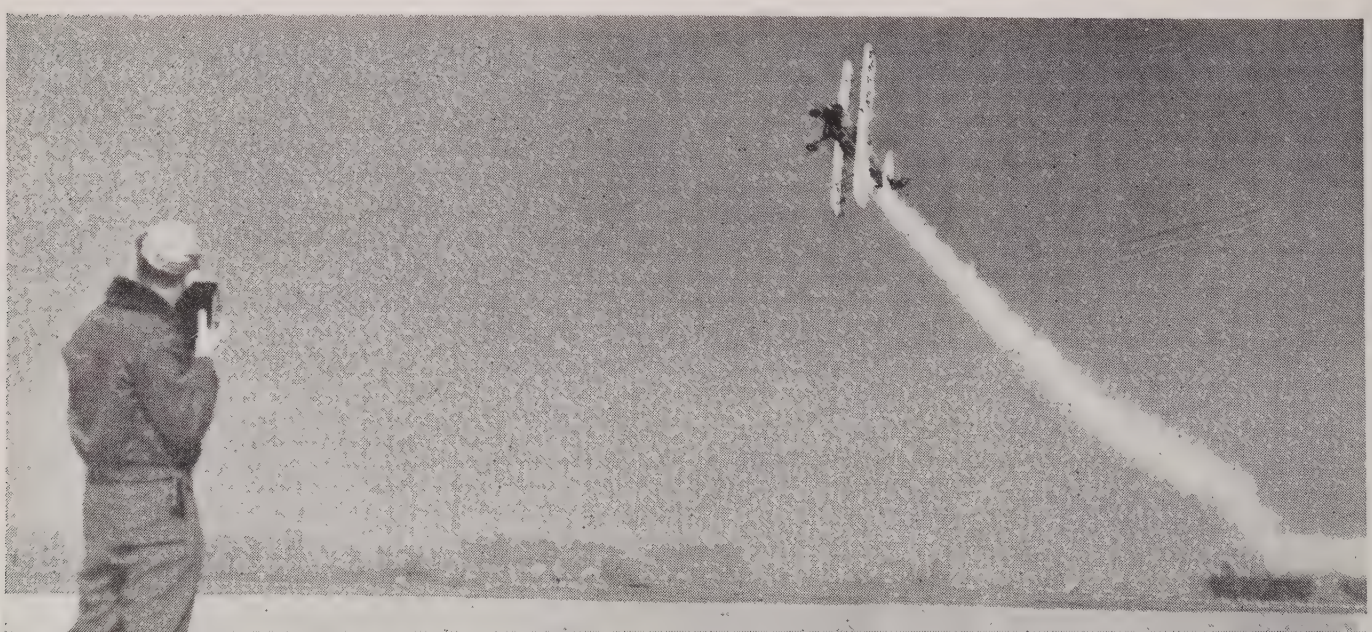
Here's how I teach acrobatics.

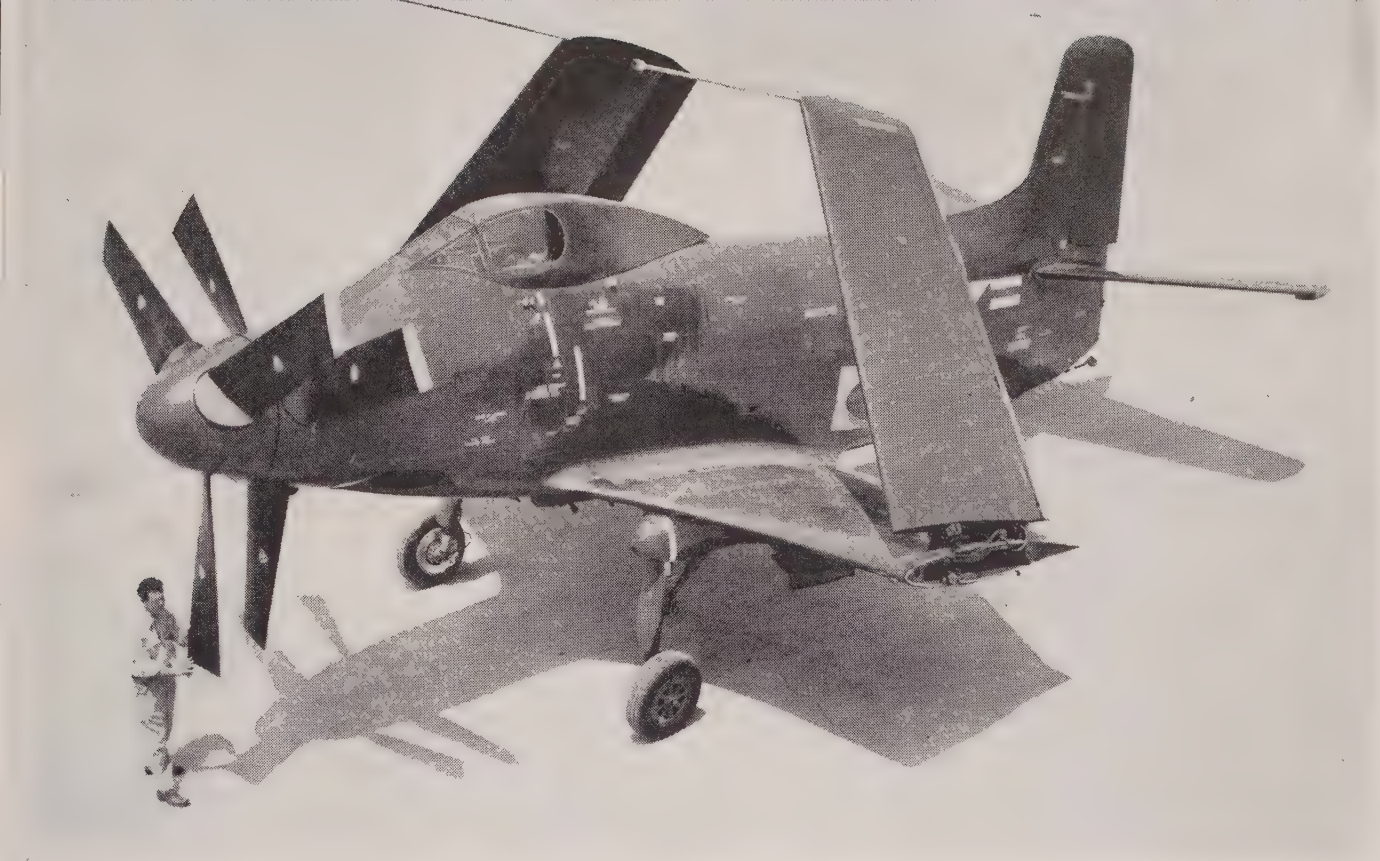
First, you must have a plane that is built to take it. Modern civilian planes have been designed for efficient cross-country flights. Their design is clean and light weight but not stressed for acrobatics. True, you can do acrobatics in any of the 1950 models *if* you know what you're doing and keep the stresses down to a minimum. No currently produced civilian airplane, however, is specifically designed for acrobatics. I can do a complete air show—excluding quadruple snaps and square loops—and never pull over three G's on my accelerometer.

My own personal choice for an acrobatic trainer is a surplus Stearman PT-17. Of all these rugged biplanes that were used as primary trainers, I have heard of only one structural failure in the air. One of our wartime instructors at the Rankin School of Aviation, where I ran the instructor-refresher school, made an extremely rough pull-out following a terminal-velocity dive and a lower wing panel disintegrated. He brought the (*Continued on page 36*)

AEROBATIC STEARMAN is licensed with jump seat. Here Mason and his A & E King adjust the jump seat in the PT-17

MANEUVER that's called "most difficult" is the 8-point hesitation slow roll, as done here by able airman Sammy Mason



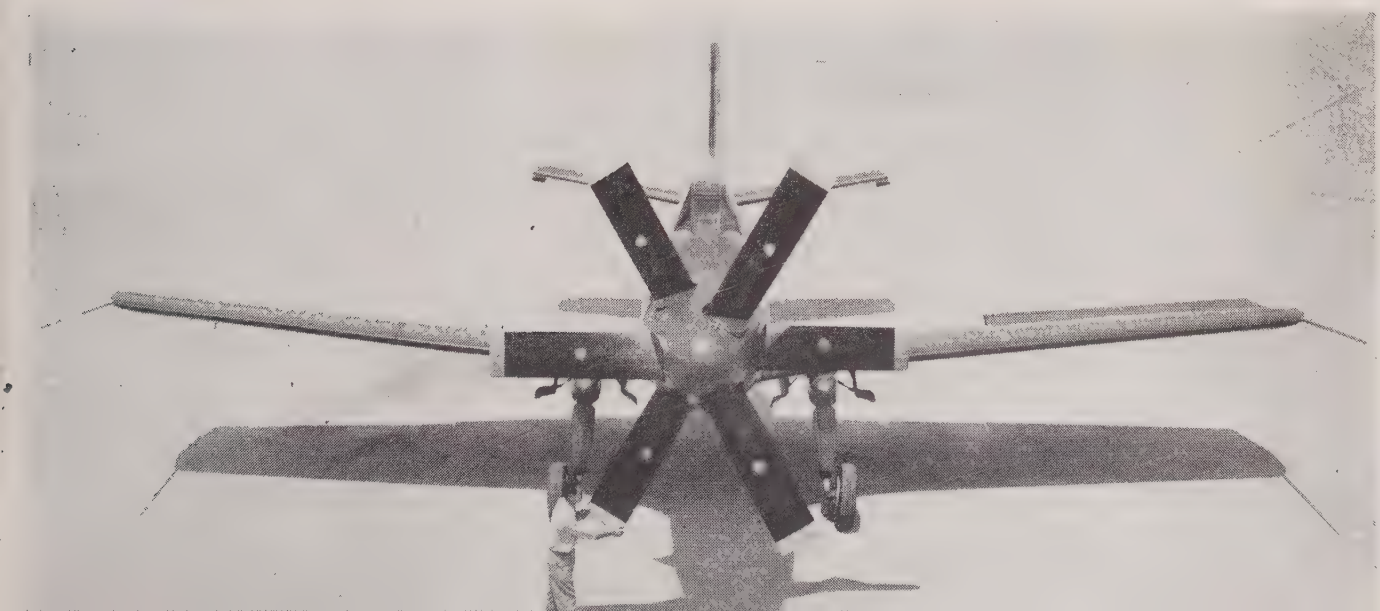


A2D SKYSHARK recently made its maiden flight at Edwards Air Force Base, Muroc. It offers speed, range, payload

NEW... Navy A2D

A NEW Navy attack bomber, built by Douglas, recently was announced by Navy BuAer. Designed as a successor to the famed and versatile Douglas *Skyraider*, the new A2D *Skyshark* is the first tactical airplane to use turbine-driven props. Powered by the T-40 Allison twin turbo-prop engine driving two counter-rotating Aeroproducts props, the *Skyshark* has the speed, range and payload which makes it able to perform combat missions with or without jet fighter escort. The plane's take-off ability permits its operation from small carriers as well as short fields. Its armament will consist of a variety of rockets, bombs, etc.

PROPELLER used on the *Skyshark* is an Aeroproducts dual rotation turbo-prop delivering great propulsive horsepower



CALIFORNIA COMMUTER

7:15 A.M.—Bob Hazelton leaves his home in San Marino, California. He hops in his Ford and points her nose to Rosemead and the airport

7:30 A.M.—Our California Commuter parks his car at the airport fence, then climbs under and out to his *Bonanza*. At 7:31 he gets into his airplane, checks everything, and relaxes for the 45-minute hop from Rosemead to San Diego. His ship has full set of gages

7:40 A.M.—Enroute to San Diego, Hazelton's flight plan is Rosemead to El Toro to Oceanside fan marker to San Diego

8:15 A.M.—Lindbergh Field at San Diego sits off the right wing of Hazelton's *Bonanza* on its final approach

8:18 A.M.—Businessman-flyer Hazelton parks his air plane, then walks a hundred yards to his office in the corner of the United hangar. He's at his desk by 8:22. At 6 or 6:30, Ben reverses the procedure, flies home

BOB HAZELTON goes to work every morning, just as you and I. He leaves his home in San Marino, a suburb of Los Angeles, at 7:15 A.M. At 7:30 he parks his car in Rosemead . . . and by 8:15 or 8:30, he's unlocking his office door in San Diego, some 105 airline miles away.

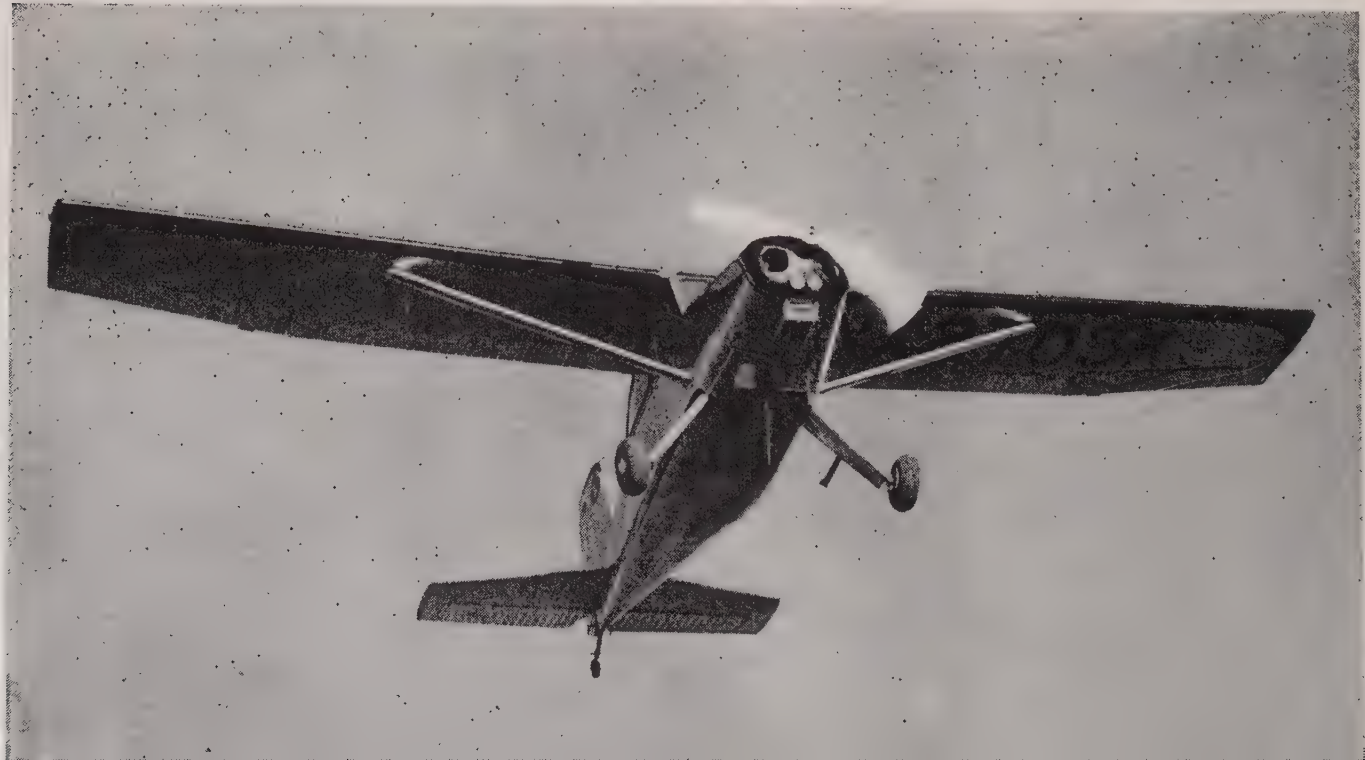
Mr. Hazelton's job is selling airplanes . . . and his theory is "what better way to prove the usefulness of an airplane than to fly it to work everyday." In the first two months of Hazelton's five-times-a-week flying to work, he was never forced to turn back because of bad weather. He uses an average of 12 gallons of gas a day on the 210-mile round-trip and the air trip to San Diego takes just 45 minutes. When Mr. Hazelton drives from San Marino to San Diego by car, it takes him three hours . . . and 12 gallons of gas each way. All of which proves to customers it pays to fly.

AIRSPEED is necessary to maintain in flight. If your airspeed indicator is off, you can't determine your best cruise speed

Know Your IAS

By J. W. ROCKE

CRUISE economy is necessary to good plane operation. Without an accurate airspeed reading, plane owner is "blind" flying



Your plane's airspeed indicator is an important instrument . . . watch it

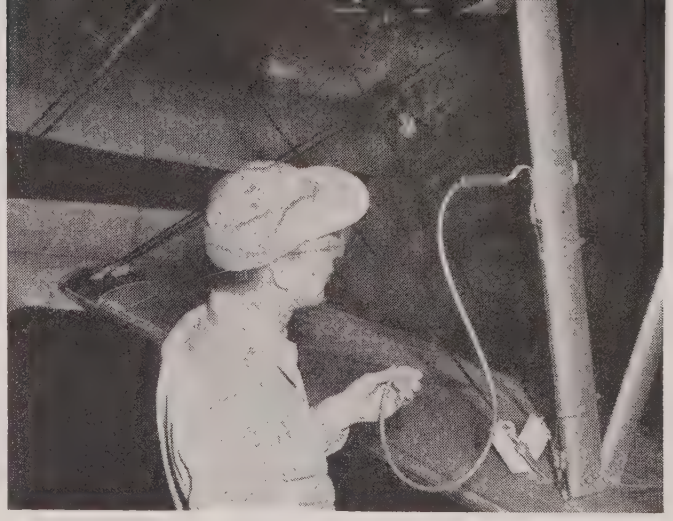
Did you ever drive a car without a speedometer? You'd feel pretty lost without that familiar instrument, yet it isn't nearly as important to you as the airspeed indicator on your airplane. The loss of your speedometer conceivably could get you a traffic ticket, but in all probabilities the average driver would estimate his speed from passing objects and not be too far wrong. Estimating airspeed is another matter . . . and it "ain't" so easy, chum.

Forward speed is necessary to maintain flight or —to put it more accurately, *airspeed* is necessary to maintain flight. Some airplanes give the pilot ample warning when nearing the stalling point, others "pay off" almost without notice. An accurate airspeed indicator provides the only means of forecasting the stall. It is also useful in determining the best altitude for climb, glide and economical cruise.

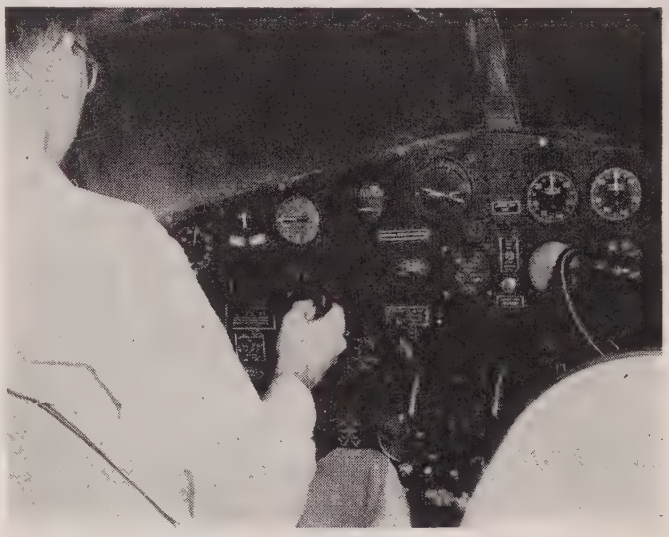
For navigational purposes a ground speed indicator would be invaluable, but unfortunately there is "no such animal." Here again the pilot must depend upon his airspeed instrument as a navigational aid, with corrections applied for altitude, temperature and wind in order to arrive at a true ground speed.

Inaccurate instruments are just about as bad as none at all, so here are a few pointers to help you keep your all-important airspeed indicator accurate.

Pitot-static lines are most frequently the trouble source for airspeed-indicator complaints, barring actual physical damage to the indicator. A pitot-static tube which is bent out (*Continued on page 53*)



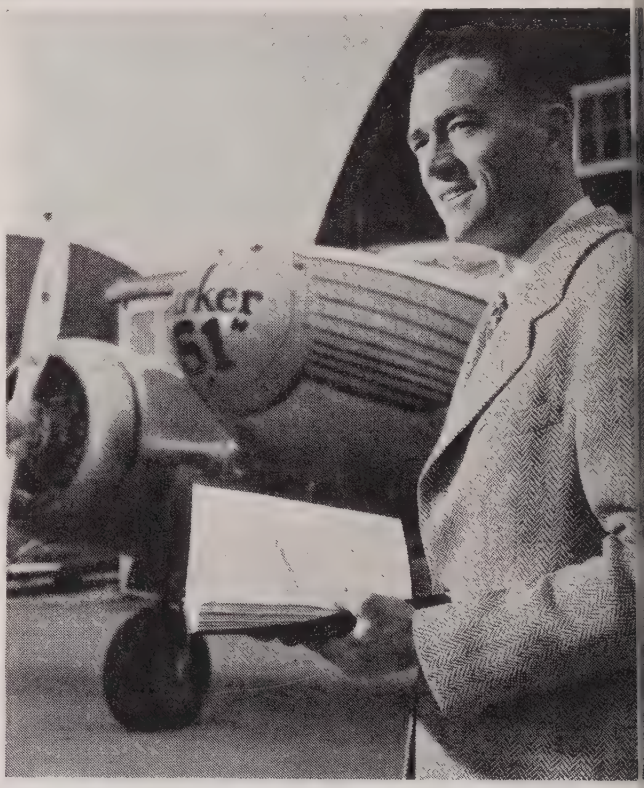
AIR LEAKS in the airspeed lines may be traced down with no more equipment than a length of rubber tubing *(above)*. Care should be exercised in using it, however, because a pilot does not look forward to being caught minus IAS



PROTECT your plane's pitot tube with a cover when the ship is on the ground. Tie red streamer on pitot cover

PITOT TUBES are not built to be leaning posts. This is one way a pitot tube gets bent out of proper alignment

EXECUTIVE PLANE presently owned and operated by Parker Pen Company, Janesville, Wisconsin is a Twin-Beech *(above)*, a luxurious Pratt and Whitney-powered plane piloted by Lee Haynes *(right)* who's flown for 21 years



Pen-Air

Parker Pen Company began using planes for business back in 1928. now flies Twin-Beech

DUOFOLD was name given Parker Pen's first company airplane, a high-wing cabin Fairchild with a 425-hp engine

You might think that people at The Parker Pen Company in Janesville, Wisconsin would register mild suprise on learning there is an air operations office practically in the middle of their general offices. Pens and planes hardly seem to mix. But after 23 years of contact with the firm's many air activities, scarcely an eyebrow lifts. This high-geared, middle-sized corporation helped pioneer the idea of a business-owned airplane, and without a doubt is one of the most airminded establishments to be found in America.

From top brass to greenest workman, everyone seems to have taken to the air. During warm summer months, the local airport is the gathering place for leisurely ventures in "hangar flying" and actual flight training. Several Parker people hold commercial and instrument ratings, and as early as 1946, an informal survey showed that there were 43 private pilots among the ranks of employees. It is easy to understand, therefore, why water-cooler gatherings can and quite often do lead to intelligent discussions on everything aeronautical from *Liberators* to lox.

Much of this interest in the upper regions stems from contact with the company's sleek, new Twin-Beech which is at the disposal of all company officials, both senior and junior grade. The blanket invitation to use the Beech is more a matter of economics than altruism. For in the matter of operating executive aircraft, it has been found that the key to economy is a (*Continued on page* 48)

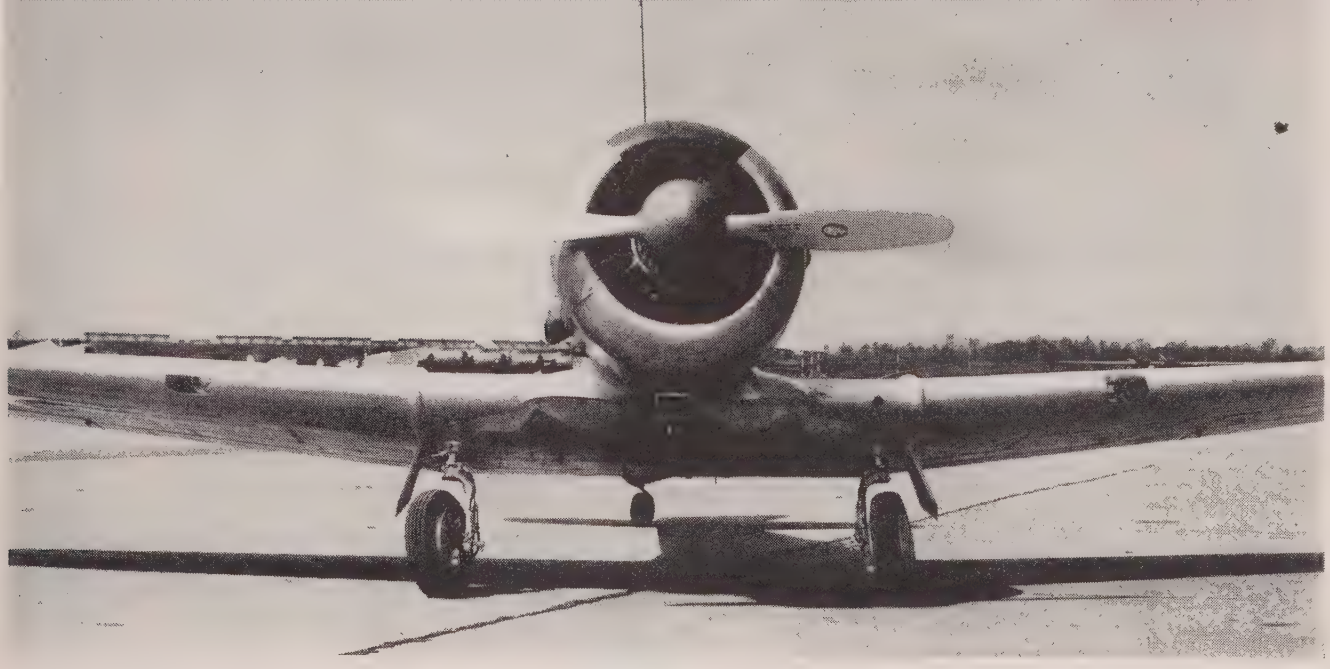
VERVILLE was the third ship owned by the company. In this one *(above)* Kenneth Parker made first airmail delivery of pens to stationer in Rockford, Illinois. Today's Beech flies Mr. Parker *(far left)* on executive trips

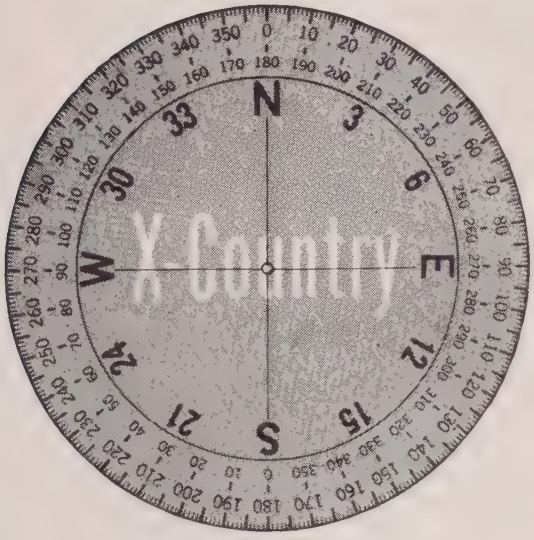
PARKER PLANES in 1929 were the Fairchild Duofold *(below, left)* and the Fleet biplane with its 110-hp Warner engine

EKLUND TE-1 (*below*) is a single-seater designed by a Finnish aero engineer. Wanting inexpensive construction and simplicity, the engineer incorporated a tricycle landing gear utilizing 5.5 x 4 low-pressure tires to absorb landing shock. The plane's wings fold to permit hangaring in an ordinary car garage. The ship is built of wood throughout and is powered by 28-hp Poinsard flat-twin engine. Top speed is 87 mph, cruises at 75 mph.

DUSTING SCHOOL, Tyler Flight Service Corp., Long Island, N. Y., is reported to be one of largest. Its contracts take planes all over North and South America. Their equipment includes 13 Vultee BT-13's, 2 N3N-1's, a Waco UPF-7, a Stearman PT-17 and two Douglas B-18's.

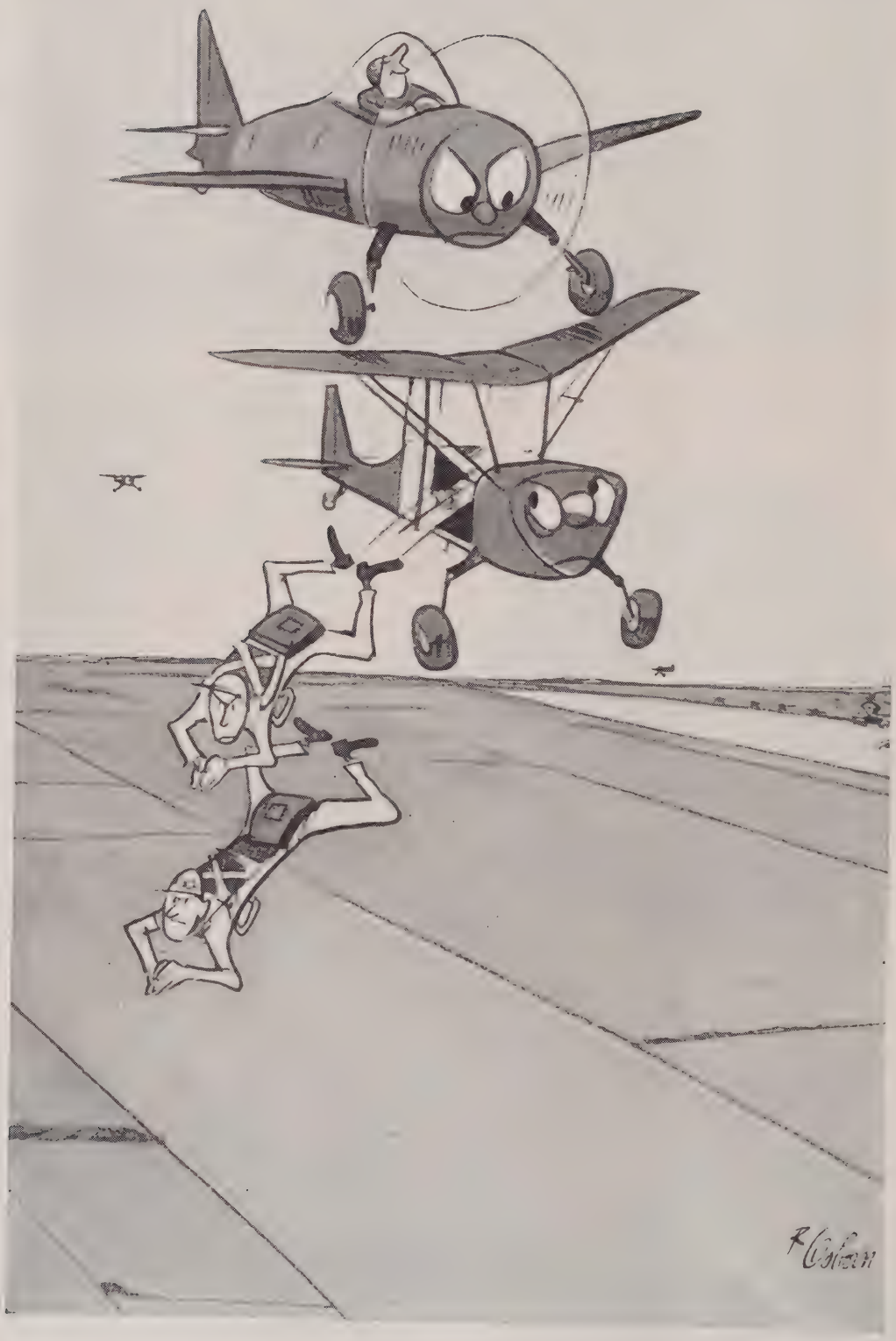
NEW VERSION of the four-jet B-45 is this RB-45C, a "special missions" airplane designed for long-range, high-speed, high-altitude photo reconnaissance. Note the new nose on the *Tornado*. Powered by four General Electric J-47A engines, it is 550-mph plane, carries crew of four.





AIR FORCE T-6 *Texan* trainer is the first military aircraft to be equipped with the Goodyear crosswind landing gear. The castered wheels, designed especially for military planes, swivel 30° on either side of center line of the plane, thus allowing the T-6 to land in winds up to 40 mph 90° across the runway. A special locking device is included in this design so that the wheels may be used free-castering or fixed.

CULVER PQ-14A was used during the war as a radio-controlled aerial target ship. A Connecticut pilot bought one war surplus and has converted it for use as a personal plane. CAA has granted it a Restricted license and only maneuver permitted is a stall. Engine is 130-hp Franklin; top speed is 190 mph; cruises at 160 mph and it has a climb of some 800 fpm. Landing speed with flaps is 70 mph and it has a range of 600 miles.



Dilbert's a heads-up flyer . . . . so far up he doesn't see where he's going!

DILBERT

By S. H. Warner and R. Osborn

Runways Shrink—Dilbert's flight to the mountains on a hunting trip was uneventful. When he started his take-off for home, however, it was very hot, and there was no wind. The small plane took an extra long run to become airborne, climbed very slowly, and then flew smack into some pine trees just beyond the boundary fence.

Results of this fiasco: one banged-up pilot, one incinerated airplane, and one small forest fire.

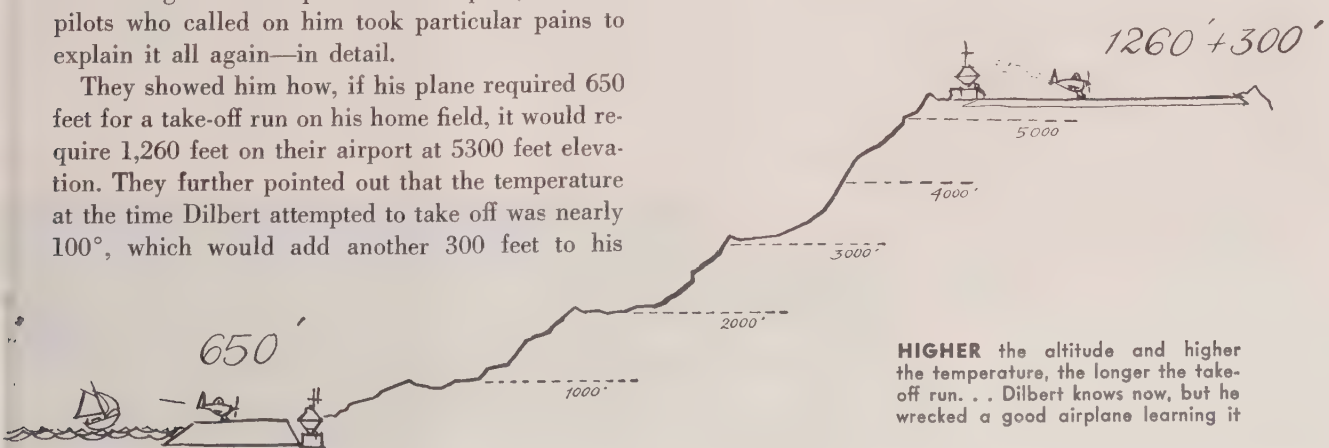
Sure, Dilbert was purely a sea-level pilot. But during his student days he had been taught all about the adverse effects of higher altitudes and temperatures on airplane performance. He probably won't forget it this time, for during the two aching weeks he spent in the hospital, the local pilots who called on him took particular pains to explain it all again—in detail.

They showed him how, if his plane required 650 feet for a take-off run on his home field, it would require 1,260 feet on their airport at 5300 feet elevation. They further pointed out that the temperature at the time Dilbert attempted to take off was nearly 100°, which would add another 300 feet to his take-off run thus making it some 1,560 feet.

They explained to Dilbert how all airplane performance figures are based on a temperature of 59° F. at sea level; that it was all a question of air density. The higher the altitude, or the hotter the weather, the less the density and hence, the greater the speed required to maintain flight.

During his convalescence, Dilbert doodled out three tables on what happens to airplane performance when temperature and altitude vary from "standard." They are included here in the hope that they may prevent others from learning this important lesson the hard way.

1. If the runway is higher:
   a. You will need more runway to get off.
   b. Your rate of climb will be less.
   c. Your approach will be faster; hence,
   d. Your landing roll will be longer.
2. If the air is hotter: (*Continued on page 56*)



HIGHER the altitude and higher the temperature, the longer the take-off run. . . Dilbert knows now, but he wrecked a good airplane learning it

CAOA REPORT . .

CORPORATION AIRCRAFT OWNERS ASSOCIATION, INC.

Corporation Aircraft Owners Association is a non-profit organization designed to promote the aviation interests of the member firms, to protect those interests from discriminating legislation by Federal, State or Municipal agencies, to enable corporation aircraft owners to be represented as a united front in all matters where organized action is necessary to bring about improvements in aircraft equipment and service, and to further the cause of safety and economy of operation. The CAOA headquarters are located at 444 Madison Avenue, New York 22, N. Y.

New CAOA Members

Since the Forum, nine new members have been accepted by the Directors. This brings the CAOA fleet to 180 airplanes, of which 130 are multi-engine ships. Here are the new members:

Continental Oil Company, Ponca City, Oklahoma. This company has operated aircraft as an aid to business since 1927, and presently operates a fleet of seven, including a converted B-25 and Twin Beech based at Houston; two *Lodestars*, a Lockheed 12A and a *Bonanza* based at Ponca City; and a Twin Beech based at Denver. Cletus F. Zimmerman (ATR) is Supt. of the Aviation Section and also chief pilot.

Dow Chemical Company, Freeport, Texas. This company operates a Douglas DC-3 based at the Houston Municipal Airport, with a high utilization averaging 75 to 80 hours per month. Dr. Beutel, chairman of the board, is in charge of aircraft operation, and H. E. (Ted) Merchant (ATR) is chief pilot.

Briggs Manufacturing Company of Detroit. This well-known automobile body builder operates a Grumman *Mallard* that is based at the Detroit City Airport. W. D. Robinson, president, will represent the company at CAOA meetings, and John S. MacManus (ATR) is the pilot.

Grimes Manufacturing Company of Urbana, Ohio. Grimes Mfg. makes aircraft lighting equipment, and has been accepted as an Associate Member. The company operates a Beechcraft *Bonanza* for some 900 hours per year and a Grumman *Widgeon*, both based at Grimes Field. Pilots are Robert Cummins and Warren G. Grimes, company president.

Ashland Oil & Refining Company of Ashland, Kentucky. This is the third oil company to join the association since January. Ashland operates a *Lodestar* and two Cessna 195's, based at Huntington, West Virginia, and a Ryan *Navion* at Oklahoma City. The chief pilot and CAOA representative is A. Blaine Berkstresser (ATR).

The Parker Pen Company, Janesville, Wisconsin. Another pioneer in the business flying field, Parker Pen has operated aircraft since 1926. Their present plane is Beechcraft D-18S, N-5151—a license number which may remind observers of one of the company's well-known products. R. Lee Haynes is pilot, and Allen H. Center, Director of Public Relations, will represent the company at CAOA meetings.

Knox Glass Associates, Inc., Knox, Pa. A large manufacturer of glass products, the company has operated aircraft in their business for the past five years. Their present plane is a Lockheed *Lodestar* based at Franklin, Pa. Director of Air Transportation and chief pilot is Jack A. Huth.

Grumman Aircraft Engineering Corp., Bethpage, L.I., N.Y. Elected to an Associate Membership, Grumman is also an old-timer in the use of aircraft as an aid to its business, having done so since 1931. Two of their own Grumman G-73 *Mallards* are used for this purpose at the present time. Pilot in charge is H. J. Schiebel. CAOA representative is Jack B. Rettaliata, Public Relations Director.

Beech Aircraft Corporation of Wichita, Kansas. Beech also was accepted as an Associate Member on the same day. By an odd coincidence (!), this company uses a Twin Beech as an executive aircraft, bringing the total number of Beechcraft 18's in the CAOA fleet to 50.

CAOA Directors Elected

At the annual meeting of the Association in Washington on May 18, the following directors were unanimously elected: For the term expiring in 1953, William B. Belden and Donald Bixler were re-elected, and Joseph B. Burns, attorney, of Fuller Brush Co., was elected. For the term expiring in 1952, Cornelius Fulton, Jr., and John C. Yost, pilots of Mathieson Chemical Corp. and Armstrong Cork Co. respectively, were elected, and Cole H. Morrow continues. Howard L. Maurhoff, John R. Dunham and Walter C. Pague continue for the term expiring in 1951.

At the Directors' Meeting of June 20, W. B. Belden of Republic Steel and H. L. Maurhoff of National Dairy Products were re-elected Chairman and Treasurer respectively for one year. These two officers, plus Donald Bixler and John Dunham were confirmed as Executive Committee for another year.

The Chairman appointed Cole Morrow (chairman), Walt Pague and John Dunham as Technical Committee.

Airport Notes

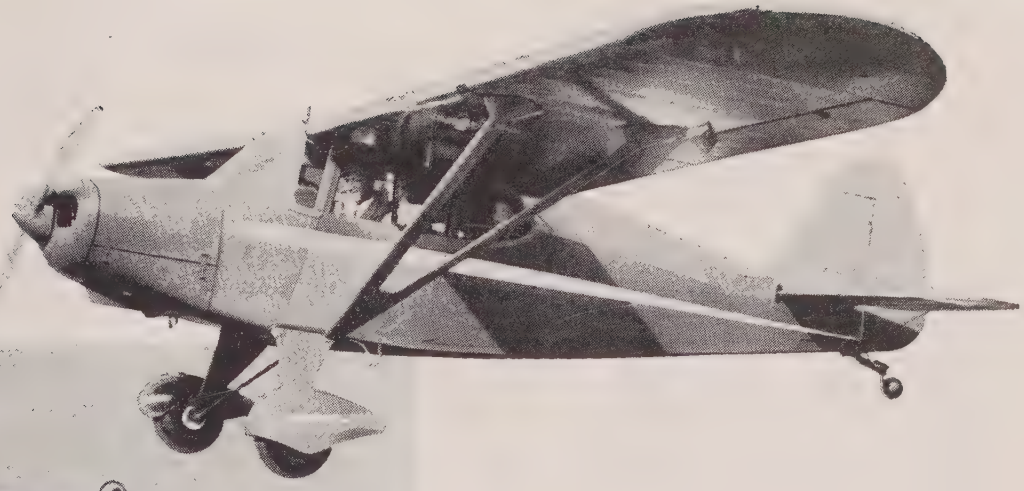
Based partly on suggestions from pilots of CAOA member aircraft and partly as a result of Board Chairman W. B. Belden's talk at the AAAE Convention at Columbus in April, we have been receiving at headquarters an increasing flow of information regarding airports catering especially to executive aircraft operations. The following are a few recent examples:

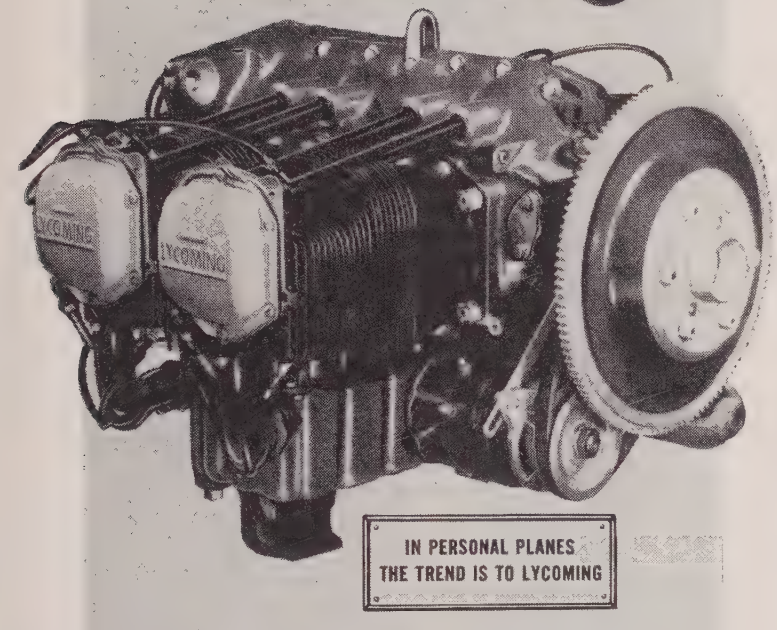
El Paso Municipal Airport. This airport has four 7,000-foot paved runways; stocks 80, 91 and 100 octane gas; full CAA facilities; excellent restaurant—all on 24-hour schedule. If pilot of executive aircraft will radio ETA, service truck will be ready in front of terminal building for convenience of passenger unloading, and will be met by airport manager Charlie Moore or his assistant. Servicing of aircraft will be handled on a priority basis. El Paso was recommended by Forest Johnston of Honolulu Oil Co.

Gary Airport, Indiana. Calumet Air Service informs us that operations at this 'port were scheduled to begin July 15. It is located two miles west of Gary on U. S. Highway 12 and 20, the direct highway to Chicago, 40 minutes away by South Shore Electric Line. Avoids flying over water and heavily congested territory. Has two hard-surfaced runways, 4600 and 3100 feet. No landing, parking or tie-down fees; gasoline and oil is available in all grades and at standard prices. Mechanical service all daylight hours. Write Calumet Air Service, Gary Airport, Gary, Indiana, for map of Chicago area showing exact location of the airport; this can be used until it is marked on the official airway maps.

Holman Field, St. Paul. The St. Paul Association of Commerce informs us that the use of Wold Chamberlain Field for non-scheduled flying will be curtailed during the 1950 season because of an extensive construction project. Complete facilities for executive aircraft are offered at Holman Field, five minutes from St. Paul business district. Until August 31 control tower (396 kc) is open from 3:00 P.M. until 11:00 P.M. weekdays, and from 8:00 A.M. to 6:00 P.M. Saturdays and Sundays. After September 1, it will be open 16 hours every day and under control of CAA. All grades of gas and oil, and engine and shop overhaul facilities are available. The field is Hq. for Minn. National Guard Air Force and for Northwest Airlines. Map, picture of field and other information can be had from Air Commerce Committee, St. Paul Assoc. of Commerce, 332 Cedar St., St. Paul, Minn.

BRITISH D. H. DOVE is used by Imperial Oil Ltd. (Canada) as executive aircraft, seats eight





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Slow Roll It!

(*Continued from page 22*)

ship in for a safe landing with the three remaining wing panels.

The Stearman is a good snapping airplane. With its biplane construction, it has plenty of aileron for easy-going slow rolls and the ship will do all maneuvers as well as any plane in the air—after you learn how to fly it.

The surplus Ryan PT-22 is a fine airplane for snap maneuvers but it does not handle too well inverted since it becomes quite nose heavy as you roll over. The surplus Fairchild PT-19 or PT-23 fly nicely—in fact, too nicely—in all acrobatic maneuvers. The Fairchild has such light control pressures that the student does not gain all the knowledge he should from his training. As a word of caution, some of the older PT-19's and 23's have been in trouble with the CAA because they have dry-rot in the wood wing center section caused by exposure to too many winters in the open. If you're investing in a PT-19 or 23, have this checked.

I don't recommend beginning acrobatic training in any of the heavier surplus trainers like the Vultee BT-13 or the North American AT-6. The AT-6 will do a wonderful air-show act when flown by an experienced pilot, but for student training, these ships are too fast and heavy—as well as expensive—for the average beginner. In a normal "split S," an AT-6 will drop roughly 3,000 feet while a Stearman will come down only about 800 feet.

Several of the pre-war trainers make excellent acrobatic ships. The Ryan STA is excellent and the Fairchild KR-21 is a sweet acrobatic ship if you can find one of the few that remain. I believe that the old Great Lakes biplane is the finest acrobatic airplane ever made in this country, but there aren't many of them around any more.

Whatever airplane you choose, check it over very carefully before you go up and try acrobatics. If the ship isn't in good shape, call the whole thing off.

Begin your pre-flight check right at the front end of the airplane—with the propeller. The prop, crankshaft and engine mounts take a terrific beating during some acrobatic maneuvers—especially snap rolls. This is caused by the gyroscopic action when the propeller is moved away from its original plane. It is just like trying to twist a high-speed electric fan going at full blast.

Check the prop for cracks and the blades for large nicks. Pull briskly on a prop tip to check for looseness on the shaft. Be very suspicious of micarta or wood prop blades that are mounted in a metal hub.

On the airplane itself, check the flying wires for excessive looseness that might cause flutter at high speeds. Extremely sloppy rigging has caused the aileron controls on a PT-19 to bind when the push-pull tubes were jammed against the compression ribs. Center section wires can be loosened by a hard landing and should be checked before every acrobatic flight.

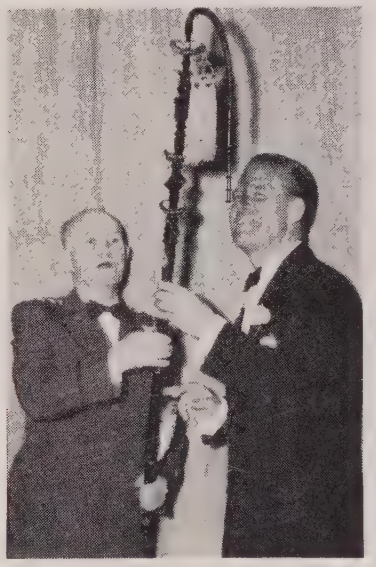
The condition of the fabric is important. Brittle or rotten fabric has been known literally to explode while building up speed for fast acrobatic maneuvers.

Fuel vents should be located as far as possible from the exhaust stacks. My Stearman has a long exhaust stack—with a smoke making chamber—located well below the bottom wing, and the fuel vents from the top of the top wing. I'll bet I've dumped out 500 gallons of gas while flying this Stearman inverted.

Just before you climb into the airplane, personally check both gas and oil caps. There's nothing like a bath of raw gasoline in the middle of a slow roll or an open oil intake that will produce a very messy airplane.

These pre-flight checks should apply to all flying, but they are increasingly important if you're going up for acrobatics. Check the inside of the airplane for loose seat cushions, mechanic's tools, starter cranks, unfastened safety belts and unanchored first aid kits and fire extinguishers. Many a farmer's roof has been bashed in by fire extinguishers and starter cranks falling out of acrobatic trainers.

Be certain that all cushions are fastened to the airframe so that they cannot fall out and become lodged in the control surfaces.



THANKS from airmen and officers of USAFE, Lt. Gen. John K. Cannon presented Horace Heidt with regimental pipe at end of Heidt show in Germany

If the ship has a battery, the caps should be tightened and the overflow vent inspected. The darn things will blow up if you shake them up with a series of snap rolls and they're not properly vented.

Wear a flying suit with zippered pockets or completely empty your clothes of wallet, glasses, fountain pens, lighters, keys, etc.

Once you're seated in the cockpit, check the controls for tightness. Have someone hold the control surfaces rigidly while you force the stick and rudder against them. If there is any unusual slack, don't fly the airplane.

Seat and rudder pedals should be adjusted carefully. The late Tex Rankin whom I consider the best acrobatic pilot ever to do a slow roll nearly cracked up his Great Lakes biplane at an air show in Wyoming because he took off in a hurry without enough cushions. He was rather short of stature and usually used a couple of cushions. His act included an inverted spin and when he pushed forward on the stick, it slipped from his hand and went full forward. He couldn't reach it with his hands and finally corralled the stick with one knee and recovered so low that he had to do an inverted pull-out right on-the-deck. There just wasn't enough room for a normal inside recovery.

Any acrobatic trainer should have a full set of shoulder harnesses. The catch on the safety belt should be a little stiff so that there is no chance of opening it accidentally by hooking a gosport speaking tube under the handle or catching it with a sleeve.

Parachutes? Of course! Make sure that the 'chute is freshly packed and the harness fits snugly. I've been flying for 14 years and have never had to use one, but I never fly without it. There are three good reasons for bailing out: fire, uncontrollable structural failure or a spin that you can't find the formula for recovery.

The first acrobatic maneuvers in my instruction book are spins since they are the basis of all snap manuevers. Now that the CAA no longer requires spins for a private license, there are many pilots piling up hours in the air who have never spun an airplane.

A spin, remember, is a stall in which one wing is still "flying" and the other wing—the one on the inside of the rotation—has stalled out. The standard NACA spin recovery will work on any airplane. With the stick all the way back and the ailerons neutral, apply full opposite rudder against the spin and hold it there until the plane shows a tendency to slow down in its rotation. Then use positive forward pressure on the stick. As the rotation stops, release the rudder pressure and gradually pull the plane out of the resulting dive. A secondary stall and spin can easily result if you "reef back" too fast on the stick and build up an accelerated stall.

Here's the aerodynamic reason for holding full back stick until after the rudder begins to work. In a spin position, forward stick will tend to deflect the air away from the rudder, causing a slow, sloppy recovery.

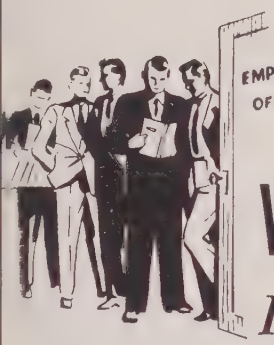
Misuse of the controls will make many an airplane spin more violently. Either using forward stick before the rudder during a recovery attempt or trying to stop the spin with aileron will make many mild spins become vicious. The only control that will begin to stop a spin is opposite rudder.

The loop is a simple maneuver so long as you have sufficient speed and don't try to hurry your way around. A biplane is easier to loop than a low-winged monoplane because the two-winged job will not "mush" as readily. I use an Indicated 140 mph in my *Wasp* Stearman at the start of a normal loop and come back easily on the stick. After the horizon drops below the bottom wing, I lean my head back and wait for it to re-appear. If you come back on the stick too fast anywhere in a loop, some ships such as the BT will do a half snap roll and pop out of the maneuver. This half snap happens most frequently at the top of a loop where airspeed is at its lowest.

A loop with a quarter-roll recover is still one of the smoothest, easy-to-perfect maneuvers in the book. The quarter roll, of course, comes during the vertical dive part of the loop.

I have done a little motion picture work.

(*Continued on page 50*)



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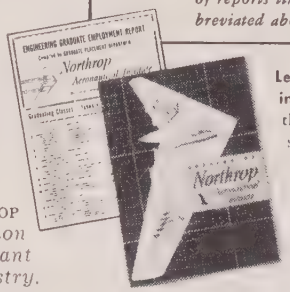

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Skyknight Rider

(*Continued from page 13*)

air pressure in the suit as more load is put on the airplane so that normally the pilot doesn't have to worry about it. One day, however, this valve stuck on take-off and the suit filled up with air before I could get my hands away from the throttles and gear switch. I felt as though I'd been hugged by a bear.

Just as soon as a prototype airplane at Douglas shows any sign of trouble, flight tests are delayed and the source of the trouble is tracked down. The *Skyknight* showed signs of flutter during early speed tests. This was indicated by a mildly high frequency vibration felt in the forward part of the fuselage. An oscillograph made an accurate record of the frequency of the vibration, and then the engineers went to work. From the frequency of the vibration they were able to trace the flutter to the elevator trim tab. Minor modifications corrected the trouble with a minimum of delay.

From a pilot's standpoint, one of the best features of the F3D is its novel escape hatch. If this system could have been used on wartime planes, there might have been fewer injuries from bail-outs. The *Skyknight* has a "laundry-chute" slide that goes out the bottom of the airplane just forward of and between the jet engines. It safely drops the pilot and radar operator at high speeds without any chance of hitting the tail. I've flown a number of Marine jumpers who used this chute exit at the Navy's Salton Sea, El Centro Base. An added safety feature is a breakaway seat that falls away from the pilot when he pulls the emergency handle that opens the "laundry chute."

In spite of its simplicity a lot of work went into the design of the F3D. E. H. Heinemann, Chief Engineer of the Douglas El Segundo plant, said, "The original specification requirements of this aircraft came as somewhat of a shock to the designers. High-speed requirements appeared to be completely incompatible with the two-place cockpit arrangement. It was only after trying many arrangements of equipment, crew, fuel and powerplants that the final arrangement of the F3D was chosen. With it, performance specifications were met and exceeded."

All normal fuel is carried inside the fuselage above the engines. Drop tanks can be added near the hinge-point where the wings fold for carrier storage. The *Skyknight* does not have conventional wing-tip tanks because of the critical control problem of flying with one tank empty. Add the undesirable wing weight from rough carrier landings with full tip-tanks, the complication of folding the wings with the tanks full and you can see why we use our tanks inboard of the hinge point. How would you fill a tip tank with the wings folded anyhow?

With that fuel inside the fuselage, you can hang your laundry on the wings in the guise of rockets, bombs or what-have-you, and go out to fight.

The first cross-country flight of the *Skyknight* was very interesting. After we had completed our own test work at Muroc, I flew the ship east to Patuxent for the Navy demonstration. Douglas crew chief Bob Heath was in the right seat when we took off on our first hop, headed for El Paso. By the time we were in the vicinity of Blythe we realized both compasses were off, so we really had to "smell" our way to El Paso.

Starter units capable of putting out a surge of 1800 amps. were few and far between when this first X-C flight was made, so I tried to land at either airline terminals or at airports where other aircraft manufacturing plants were located.

Consolidated in Fort Worth fixed our compasses and we went on east. I landed at one large Air Force base where the Operations Officer wanted to know just what a pair of civilians was doing flying in a Navy plane. We finally convinced him it was all right, but he nearly went through the roof when we asked for 100 octane fuel for a jet. The two Westinghouse powerplants in the *Skyknight* were never meant to run on kerosene-type fuel as do many jets.

The *Skyknight* and I spent four and one-half months at Patuxent. The Navy learned a lot. So did Douglas. So did I.

On the return flight my crew chief was Jack Lehman. Our trip was uneventful, except for the weather, until we hit Albuquerque. The manufacturer's contract states you're not allowed to fly any prototype model on instruments, so we had to wait at Kansas City and Wichita for the weather to improve.

At Albuquerque we nearly lost the airplane when a ground crewman accidentally touched the wing of the airplane with one of the contact points of the power generator used as a starter. Sparks flew all over the place and we found a small hole burned in the wing skin. There was so much wild electricity floating around that airplane that it reversed the polarity of the airplane's generators.

Actually a jet is a lot of fun to fly cross-country. The cockpit of the *Skyknight* is as quiet and comfortable as a DC-6. Douglas engineers licked the temperature problems in this pressurized cabin and the only trouble we have had is the blowing out of the plastic canopies that become brittle with the cold at very high altitudes.

After you've had 10,000 hours in the air, these new jets are really something to you. In 1926 I worked as a mechanic's helper and sold Sunday rides to earn enough flight instruction to solo. In those days no one was fussy about licenses and I hopped passengers for a year before the newly formed CAA (then called the Aircraft Branch of the Department of Commerce) took away my license because I was too young. I had it back a year later and have been in the business ever since. I was too busy flying to go to college, but I have learned a lot of aerodynamics by constant association with test work and from aeronautical engineers who have been very patient with me.

For three years I herded DC-2's and DC-3's between New York and Miami for Eastern Airlines. Such flying is invaluable in acquiring a well-rounded piloting career, but airline flying can become too routine.

Between times I did some racing in the old GeeBee and Northrop planes. I finished third in the Bendix dash in 1935 in a Northrop. Somehow I was never able to get into the big money at Cleveland.

In 1940, I started flight testing for Curtiss in Buffalo where the C-46 was my pet project. Shortly after leaving Curtiss, I came to work for Douglas on the Navy BTD dive bomber. Later I flew the CAA certification hops in the C-54 and worked with the unconventional XB-42 *Mixmaster*.

I have no special preferences in the layout of new type aircraft I am assigned to test. I'd just as soon fly from the back as from the front, or from the right as well as the left side of the cockpit. My main desire is to fly aircraft with good structural and flight characteristics.

On the flight line we rely on the crew that is assigned to the airplane. With an airplane that has a streamlined construction, a pilot can see nothing much of importance so far as a pre-flight inspection is concerned without taking the airplane apart. If Shirley Cummings, the crew chief, and Hayd Jennings, the inspector, say that the ship is okay to go, we go.

My checking begins when I climb into the cockpit: control freedom, radio check, chute and seat adjustment, fire bottle outside and start the engines. There's no warm-up. Once you have fuel and oil pressure, you taxi out. The *Skyknight* has a "soft" landing gear to absorb the jolts from carrier landings and it will roll a little as you taxi across rough ground. Then you hit the hydraulic actuating valve and the wings unfold. When the big red tube disappears into each leading edge, you know the wings are down and locked, and you're ready to go.

Take-off is easy. There is no reaction to torque. You just pour on the power until the airspeed picks up, and then ease back on the stick. The *Skyknight* does not have a sweptback wing, so there is no tendency for the ship to leave the ground in an excessively nose-high angle.

Rate of climb is good. We usually climb out over the water when testing out of the Los Angeles International Airport adjoining the Douglas El Segundo plant. The air is smoother over water than over the land.

A great deal of the test work is purely routine. You may go up to test the fuel flow from a new drop tank and check on a fluctuating fuel-pressure gage at the same time. You can climb to better than 30,000 feet, make your check and be back on the ground in less than 30 minutes.

The hop may be a spin test. The Navy required us to do five different types of spins in each direction: one from straight-and-level flight, one from a tight climbing turn, one with power on, and others with the ailerons set with and against the spin. The ship spins nicely and, unlike most airplanes that are hard to get into a spin, it is no trouble at all to recover. All the evaluation work on this type of test is done from photo recorders and other instruments. A chase plane goes along to watch the tests, but no attempt is made to make a visual evaluation.

We have run some very interesting cruise-control tests on an F3D with one engine off. The *Skyknight* has an engine check door that can be shut in flight to reduce the drag caused by a windmilling jet engine. The ship is so clean that it will glide almost forever with both engines shut off in this manner. Air starts are a cinch since the blast of air going through the engines the moment the covers are opened will speed them up beyond the 1200 to 1800 rpm needed to start the engines.

Your let-down and landing approach all depends on where you are flying. At Edwards Air Base (Muroc), you come across the

(*Continued on page 45*)

Tie-Down Traces

(*Continued from page 19*)

orbitant rental. Most old hangars, due to the shortage of buildings on the average private airport, have been converted into repair shops and offices. It is logical to assume therefore that for several years hangar space will be scarce.

In all fairness to themselves, new owners and those who now own airplanes must face the prospect of a hangarless existence for their craft. Then, if hangar space becomes available, consider it luck. If it doesn't, the maintenance problems inherent in outdoor storage will seem less formidable.

Even those pilots who do possess hangar space at home are not insured against outdoor storage dangers. If the airplane is used for cross-country trips, for haunting favorite hunting or fishing resorts, or for business travel, many airports and landing strips without hangar facilities will be visited, and those outdoor gremlins do not require a great deal of time to do their dirty work.

The main purpose of a hangar is to protect the airplane from the elements. The importance of hangar protection varies somewhat with weather conditions and location. The worse the weather, the more important it becomes to keep the airplane inside, or to take steps to give it as much outdoor protection as is possible.

When a choice of airports is available (and it is in most metropolitan districts), the pilot who must store his airplane outdoors should consider a number of factors. If tie-down it must be, then tie down where weather conditions and atmospheric influences will least affect the life and condition of the airplane. An extra three- or five-mile drive to reach the airport may pay big dividends in the long run.

In certain communities, weather conditions will vary sharply within a radius of a few miles. Thunderstorms follow closely the margins of a river valley, while five miles away the sun will be shining brightly; a dust-blown flat may give way suddenly to a sheltered valley where a matt of grass holds the dirt in check. Factory areas where the air is strongly polluted by harmful industrial fumes may be paralleled a few miles distant by area where the air is pure and free from corrosive gases. The effects of sea air, extremely harmful to most aircraft materials, drops sharply a few miles inland.

Of course, there are other factors besides location which influence the selection of an airport when the airplane must remain outdoors. Is it a well-kept institution? Are guards employed and night lights used to discourage prowlers? Will a dropped match or cigarette start a grass fire that will sweep the field and all in its path? And if the airport is in a rural community, is it fenced against wandering animals? Humorous as it may sound, more than one parked airplane has suffered extensive damage when used as a butting target by a lonesome bull, or a scratching post by a stray horse. An airplane tied down in the open is vulnerable to all these dangers.

Despite lack of permanent hangar space, any airport worthy of the name should provide indoor repair facilities. Whether the repair job is a major overhaul, or mere patching and re-doping of torn fabric, strict cleanliness is necessary for best results. Airborne dust, kept in motion even on still days by propeller backwash, gathers on oily parts, on tools and the mechanic's hands, and acts as a wearing abrasive when the torn down parts are re-assembled when it is necessary to make repairs outdoors, choose a windless, sunny day. Do the work as far as possible from runways and taxi strips. Spread a canvas tarpaulin on the ground to protect both parts and tools, and clean all parts thoroughly just prior to re-assembly.

The two greatest natural enemies of all aircraft materials are dust and moisture. Outdoor storage allows each of these gremlins to get in the maximum amount of dirty work. The main problems of outdoor storage revolve around ways and means to minimize the effects of both. In the desert and in semi-arid regions, dust will cause the most trouble; in other regions moisture will be the principal trouble-maker. Pilots who use their airplanes for cross-country trips will encounter both at various times.

The boys who were with the AF in North Africa can tell you about the effects of dust on engine and airplane life. The desert may have been a tactician's paradise, but it was only a nightmare to the fellows charged with keeping the combat craft constantly in the air. Yet those North African conditions are only an exaggeration of conditions found in many parts of the United States. The main difference is that results

(*Continued on page 46*)

Pilot's Report... Ercoupe

(*Continued from page 16*)

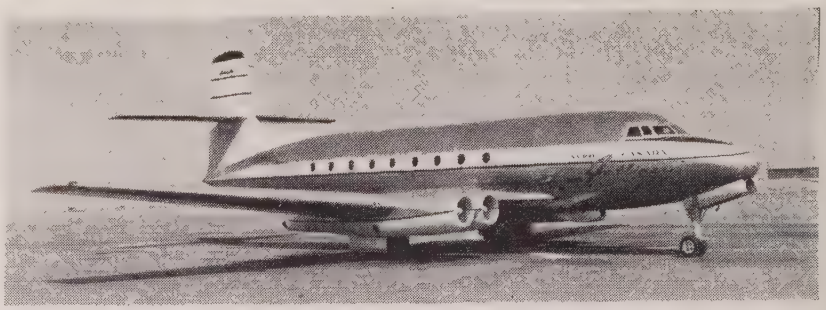
the engine cowl's Camloc fasteners, Redding pointed to what he called a "scalp-saver." This is one feature that will be appreciated by pilots and mechanics alike. It is a metal arm device which, when opened, holds the engine cowl doors in an upright, open position even under very windy conditions. No more will the cowl come clunking down on a working A and E's dome.

Another feature is the easily accessible quick-drain fuel strainer, positioned to direct waste gasoline *away* from the nose-wheel tire. Too, cowling metal fatigue has been reduced by attaching all cowl supports directly to the fuselage, thereby maintaining the cowl in a "floating" position completely free of induced engine vibration. During this flight check, little vibration was noted regardless of power application.

Continuing our inspection, we learned the Deluxe models (either two- or three-control) are powered by Continental 85-hp engines and have, as standard equipment, Sensenich 74-48 wood props which are most efficient for over-all operation. However, higher or lower pitch propellers may be used, depending on the individual owner's climb or cruise desires. Either of two metal props (Met-l and Sensenich) or a Hartzell ground adjustable may be had on an exchange basis for an additional $85. Recently, an Ercoupe was tested with the new Munk Flex-o-Prop. Results showed better climb and cruising speed.

The Ercoupe's nose gear appears to be very rugged and has a new forged "nut cracker" to reduce maintenance. A two-bearing wheel replaces the single-bearing job used on earlier models and carries a larger (500 x 5) tire. According to Joe Redding, the nose gear has been re-designed twice in previous years to increase its strength to offset the mishandling of some pilots who persist in diving the airplane into the ground while landing. For anyone who finds it necessary to constantly operate from very rough and/or soft fields, there is available a larger (600 x 6) tire and wheel assembly for an extra $60 on a new Ercoupe. This is the same size wheel used on the main gear. The kit includes a larger fork strut assembly to accommodate the increased tire and wheel size. In reply to our question concerning this large tire size relative to crosswind landings, Redding said that except for smoother taxiing, there was no noticeable change in handling characteristics regardless of wind if landings are made at minimum speed. One other nose-gear change has been the elimination of the fairing that on previous models accounted for some maintenance costs. Actually, we believe the looks of the airplane is improved by this change. The main landing gear remains the same in design and appearance and continues to provide good, rugged service.

Before climbing into the Ercoupe, it was necessary to lower the two side panels which, when closed, meet at the very top of the cabin. Strong aluminium angle strips provide good finger grips and also serve to lock the cabin via padlock. This particular airplane had two-color, non-inflamable plastic covers on the seats, available to the prospective owner at an extra cost of $60. Although this price seemed high, we were assured there was very little profit in their sales.



AVRO JETLINER is one of first jet transports. It made flight from Toronto to New York International Airport in 58 minutes. Regular airline time is 1 hour 45 minutes. Built in Canada, the *Avro Jetliner* carries from 40 to 60 passengers

Seated in the ship, we were conscious of a difference in the feel of the seat, as compared to the older models. Mentioning this, we learned the seats in the plane we were to fly were made of foam rubber, and that prospective customers now have a choice of two different seats, at no extra cost. One, the old standard high-back type; and the other, a low-back seat that permits resting the arm over the top, and facilitates your reaching the bottom of the baggage compartment. After trying both types, we expressed a preference for the high-back version. . . . perhaps because your reporter is almost 6 feet tall and he found the short seat definitely uncomfortable.

The Ercoupe's baggage compartment is fairly large. It has a weight allowance of 75 pounds and can be used for luggage or cargo . . . or, if you prefer, you can sit a child on the specially built "junior" seat atop the battery case. In addition to the seat belt provided for this "piggy-back" seat, there are tie-down straps for cargo or luggage. In the upper rear wall of the compartment is a canvas "sports tube" that will house a five-foot fishing rod or anything else of similar shape that has a maximum weight of five pounds. This also is an extra at $15.

Additional soundproofing material has been used in the cabin, including areas around the baggage compartment and under the rug-type floor mat, that has definitely improved the noise level.

The instrument panel has a thin metal overlay covering the center portion to within about 6 inches of the cabin wall. Aside from the pleasing decorative effect, it provides a semi-collapsible structure that would increase pilot and passenger safety in the event of a crash. Another safety improvement is the modified shoulder-chest harness which is available for $25. Inexpensive insurance, we think!

The standard flight instruments (airspeed, compass and altimeter) are in the top center of the panel with room for "extras" below. Engine gages are to the left; switches, hot- and cold-air controls, and fuses are on the right. The mixture-control knob, located on the lower left side of the panel, is an angular affair while the carburetor-heat knob, on the right, is conventionally round, thereby helping to prevent a pilot's working the wrong knob. A Lear PXer two-way radio is recessed into the right-hand portion of the panel. A cabin speaker is available for $12.50. Just below the radio is the navigation-light switch which also controls the indirect panel lights. The throttle and trim-tab quadrant, although standard equipment as far back as the '47 model, is worthy of mention. Somewhat along the lines of an airliner quadrant, it permits easy and positive action and presetting of the throttle with refernece to letters along its side. Too, once set, the throttle cannot creep! Frankly, we've wondered why other personal-plane manufacturers haven't used this desirable type of quadrant.

A new gadget that should prove to be a boon to X-C pilots is the Trim-O-Matic control. Causing the ailerons to act as big trim tabs, this device makes it possible to trim off wing heaviness due to uneven passenger, baggage or fuel loading. Hooked up to the aileron controls through a spring-load arrangement, the adjusting knob is easily reached in its position midway between the left and right portions of the seat, near the floor. At the present time, this feature is standard equipment on the two-control model only. We hope it becomes standard on the three-control version. Another cockpit item that deserve mention is the new push-pull window lock located on each side of the cabin, near the instrument panel. Operating on an adjustable cam principle, with small red actuating knobs, they're guaranteed not to take the skin off the fingers.

The old-style Ercoupe control wheel is still used, but we personnally prefer the larger safety-type wheel used in most of today's four-place planes.

An added stall "resist" has been engineered into the elevator system which, safetywise, is worthy of note. This spring-loaded device only makes itself felt when the wheel is pulled back far enough to slow the airplane to within about 10 mph of stall speed. From this point rearward, the additional wheel force needed to slow the ship into the actual stall is considerable and cannot go unnoticed by the pilot. In fact, this rear stage "heaviness" is such that some pilots may subconsciously fail to get the wheel all the way back during their first few landings and will hit three-point instead of touching down the main gear first, as desired. However, this is easily overcome with a little practice. Although some experienced pilots may not appreciate this added elevator "loading," we believe it is a good anti-stall safety feature, particularly for student pilots.

Completing our inspection of the cockpit area we noticed several other details. The ignition switch is of the key type, to the right of the throttle quadrant. There is a plastic sheet in front of the left wheel im-

(*Continued on page 43*)

Air Report on the Far East

(*Continued from page 11*)

areas, performing aerial photography and mapping, protecting air and sea communications, supporting ground and naval maneuvers and conducting necessary training. It is a watchdog of our position in the Far East. With 40 Soviet divisions and hundreds of warplanes approximately 500 miles from its headquarters in Nagoya on central Honshu, under Major General Earle E. Partridge, it *must* be a combat-ready air force.

For the key to Japan is air power, and Japan is the key to Asia. With dozens of developed air and naval bases, its geographical location makes it our single most important operations center in the Far East today. Should we lose Japan, Okinawa, caught between land-based offensive Red air power from Kyushu, Taiwan and the China coast, would be subjected to heavy weight of air, sea and land attack.

Loss of the four Japanese home islands means we would once again be faced with the task of having to retake or neutralize enemy power along the Asiatic and Chinese coastlines, Japan, and in all probability India and neighboring countries—besides coping with Soviet onslaughts in Turkey and North African areas. Soviet warplanes have long shown their red stars in China skies, and Soviet arms are reaching insurgent groups in Chitral and Dir at the nothern border of India. A large Soviet air base already exists at Murghab, within close striking range of all vital Central Asia points.

Air strikes by intercontinental bombers against industrial centers in eastern Europe and Asia will become the responsibility of Japan-based aircraft should we lose our hold on our North African bases; neutralization of Russian submarine pens from Petropavlovsk in Kamchatka along the entire China and Manchuria coastline may determine success or failure of supply operations in the Pacific and Asiatic oceans; besides the Philippines, lying to the south, our only all-year ports and naval bases lie in Japan at such excellent harbors as Kobe, Yokosuka, Nagasaki, Yokohama, etc.

We have in Japan the central base of operations to contain considerable Russian strength; offensive power that might well decide the difference between victory and defeat in Alaska, that might save large numbers of our bombers by sapping and destroying Red fighter strength. Extensive operations from Japan, in fact, even the threat of such operations would prevent release of Soviet divisions and equipment to European and other fronts. The number of divisions we can contain in eastern Asia will depend in great part upon our decision to arm Japanese troops and employ a Japanese army as an integral part of our Far East military strength.

This time, should world events force us into an Asiatic war, we shall not be confronted with a nation whose industrial capacity at no time exceeded 10 per cent of ours. In our war against Japan, we faced a nation incapable of building heavy bomber strength, which fell far behind in the electronics race, which could not even begin to dream of the industrial organization with which to produce an atomic or hydrogen bomb. Instead, confronting us is a military colossus capable of conducting intercontinental warfare with modern weapons, whose well-dispersed factories bid fair to outstrip ours in productive capacity of high-quality military weapons and whose present military strength dwarfs ours.

Paradoxically, the fact that Russia's army possesses tremendous mechanized power far superior to us in weight of tanks and massed artillery (Russia is building 1,000 60-ton *Stalin* tanks a year; we have *one* 60-ton tank prototype), will not have nearly as much bearing upon a conflict in the Japanese islands as it would over the European land mass.

For a great, mechanized land war will never be fought across the picturesque Japanese terrain. The very nature of that terrain precludes such an occurrence. One of the most impotant factors of mechanized warfare is that of communications, *and there is not a single through highway on Honshu or the other three Japanese islands.*

Though difficult to believe, such a fact is true. Not a single through highway is to be found even connecting any two of the major industrial cities of Japan. After struggling in jeeps and trucks over the celebrated Japanese "roads," it becomes only too apparent that Japanese terrain makes for slaughter of ground forces from *superior tactical air power.* With the exception of the major cities and a few highways leading from these cities, paved roads are a rarity in Japan. The average Japanese road is a twisting, torturous and narrow dirt strip, much like that of Formosa,

(*Continued on page 42*)

Air Report on Far East

(*Continued from page 41*)

and bordered on either side by road-hugging Japanese shacks and the treacherous rice paddy. The country is mostly of a mountainous nature, with every available level stretch of land, and even the sides of mountains, a complicated affair of irrigated paddies, canals, waterways and mud.

It is difficult enough for an unhampered jeep to struggle across Japan, let alone heavy tanks, which would be forced to travel single file, their bulk taking up the entire road while they turned and twisted on roads isolated by the quicksand-like rice paddies on either side. On more than 80 per cent of the Japanese roads, it is difficult for two tanks to pass abreast of each other. Merely going off and around the road is no panacea, no tank has yet been built that can move through the mud and mire of rice paddies soaked in water for centuries.

There could be no large-scale troop movements except by rail, in the same manner that the Japanese conducted their wartime communications, for when two trucks meet on these narrow roads, an engineering miracle literally must take place to permit them to pass. The writer has driven vehicles from one-quarter ton jeeps to 10-wheeled 6 x 6 trucks on Japanese roads, and it is easy to envisage what would happen should truck convoys fall prey to fighter-bomber or attack aircraft—it would be the P-47's of France all over again, but on a worse scale. For here there are no side roads available for detours as in Europe, and several disabled tanks could sever further communications unless they were pushed entirely off the narrow road.

The battle for Japan must be a battle of the infantryman and the tactical air force working together as a coordinated team. The recoilless weapon will be appreciated here more than anywhere else. It is in Japan that we may witness the full development of helicopter-borne shock troops, and military men are seriously considering the accelerated use of large troop helicopters in combat. (The Marines already use Naval helicopters for assault maneuvers.) Such machines with good troop and weight-carrying ability would eliminate many of the problems created by the Japanese terrain. Light tanks and armored vehicles could easily be transported to local combat areas where they are needed, *over* the canals, waterways and rice paddies, while groups of troop-carrying helicopters could swiftly land hundreds of shock troops in any given area from a Fifth Air Force base or Army camp within minutes and with pinpoint precision from the time they are requested.

The full effectiveness of mechanized equipment, and paratroopers, would not be entirely lost in Japan. In city areas, where the roads are paved and one might expect fair surface communications from 20 to 50 miles from each city, we may expect employment of heavy equipment; in the writer's opinion, *only* in such areas. There will be no surging cross-country drives such as that of Patton's Third Army across France, at least not in the Japanese interior.

If any one point was borne out by the airborne operations in Europe during World War II, it is that parachute troops lose their effectiveness once prevented from swift ground reorganization, such as occurred in many of the more unfortunate instances during the famed Holland drops. The success of airborne troops depends in great part upon their ability to re-form quickly and function as a compact, mobile force after a jump (at least when the jump is made within well-defended enemy territory). Because of the scarcity of good jump areas in vital parts of Japan, the airborne trooper in that country may well become the helicopter-borne trooper. Mass airborne drops in Japan may be expected to be concentrated against the rather isolated air bases and city areas.

The Japanese have always moved their heavy equipment by rail or sea. One of the "wonders" of our air assault against the Japanese home islands in 1945 is that we never struck directly at the highly vulnerable Japanese rail system. At Nagoya, for example, the heart of the eastern rail system (the only main line in eastern Japan, in fact), where the bulk of all north-south trains must pass, went untouched during the great raids against that city. The modern Nagoya yards and station, in the very center of the curving island of Honshu, were untouched by bombs. An effective air blow at this rail area would have crippled more than 75 per cent of Japanese rail communications.

(Ed. note: *Sagoya itself was so severely bombed that it was described as "the deadest industrial center in all Japan." The city proper was 40 per cent destroyed after receiving 10,641 tons of bombs, and the great factories within the city, including the tremendous Mitsubishi aircraft works, were left total wrecks after the last great raid of 17 May 1945.*)

The mountainous terrain of Japan and its high number of railroad tunnels also imposes high vulnerability on the Japanese rail system. Kyushu, the southernmost island, would be completely cut off from Honshu through destruction of either rail tunnel entrance connecting the two islands. Similarly, there are other such vulnerable points where the rail lines twist and wind through treacherous mountain passes. Landslides precipitated by high explosive bombs in certain areas would completely cover the main track lines to the extent where weeks of labor would be required to resume operations.

For reasons such as these, air transport in any defense of the Japanese islands will play as great a part as did the airlift during the Berlin blockade. In fact, during the time our troops and airmen were stationed in South Korea, literally all communications were supplied by air transports in the Fifth Air Force's "little airlift."

The Fifth, a tactical air force born in combat with its teeth cut on the barrel of a 50 caliber, is ideally suited for the type of tactical air war demanded by Japanese geography. It is a tough air force, with modern equipment. Its morale is high; with only four Army divisions spread throughout Japan, it is the prime military factor in that country, the first occupation air force in history.

The Fifth is a component of the Far East Air Forces (FEA) under Lieut. General George E. Stratemeyer, wartime CBI commander. It is comprised of the 314th Air Division with headquarters at Johnson Air Force Base near Tokyo, and the 315th AD with headquarters at Itazuke AFB on Kyushu. Under these are the bases, ranging from chilly Misawa AFB on the northern tip of Honshu (there are no active fields on Hokkaido) to Ashiya and Itazuke on the seashore of the southern Japanese island. Troop carrier squadrons, operating out of Tachikawa AFB with courier flights to bases in Japan and Korea and other air force installations in the Far East, provide airline service for all military forces in Japan.

Transition from reciprocating-engine fighters to the jet aircraft is almost complete, with North American F-51D *Mustangs* replaced by the 605-mph Lockheed F-80C *Shooting Star*. Northrop F-61B *Black Widows* have been replaced by the long-ranging, day and night fighter, the 480-mph North American F-82E *Twin Mustang*, which flies constant day and night patrols. Many F-51D fighters will remain in Japan, but the main fighter force of the modernized Fifth is now the F-80C.

Augmenting the Fifth's fighters are those of the Royal Australian Air Force's 77th Fighter Squadron at Iwakuni, 30 miles from Hiroshima, which has replaced its war-weary Chance-Vought *Corsairs* with late-model *Mustangs*.

Standard bomber type is the Douglas B-26B/C *Invader*, still rated as one of the world's deadliest attack aircraft. With a 300-mph-plus speed and a bristling armament of 18 .50 cal. machine guns, 14 rockets and several thousand pounds of bombs, it is well suited to Japanese combat conditions.

Liaison, both air force and army, is performed with Stinson L-5 and Ryan L-17B *Navions*. In the trainer and utility field are North American T-6 *Texans* and Beechcraft C-45 *Expeditors*. Transports include the Curtiss C-46 *Commando*, Douglas C-47 *Skytrain* and C-54 *Skymaster*, with converted Boeing B-17's flying as personnel transports.

Both SB-17 *Fortress* (FAF) and B-29 *Superfortresses* (FEAF) are used for reconnaissance and air-sea rescue. An important member of the air-sea rescue team is the Sikorsky R-6 helicopter, seen in increasing numbers in Japan. With the Northrop F-15 *Reporter* out of service, photographic-reconnaissance is the mission of the 600-mph Lockheed RF-80B *Shooting Star*.

If war comes, invasion of Japan is not a possibility to be ignored. American airmen and troops in the Far East are aware that Japan is sitting on Russia's back doorstep, that Russia must eliminate Japan as a threat to her Asian sphere of influence. Within some 500 miles of Tokyo there are 10 times as many Soviet troops as there are American soldiers in all Japan. Northern Hokkaido, the only Japanese area with ample level terrain, is literally defenseless, and right under the nose of Karafuto. Yet, almost any G.I. in Japan today prefers remaining there than being stationed in Germany. (During 1949, two out of every three men in the Far East Command whose time was up either re-enlisted or extended their overseas time.) The Fifth Air Force and Eighth Army were a good team once before in war. If need be, the performance can be repeated.

Our forces in Japan today are not expected to be capable of withstanding a determined Soviet onslaught for any great length of time. Budgetary limitations and the availability of modern aircraft limits the number of warplanes we can base in Japan; nevertheless, there is sufficient air strength

(*Continued on page 47*)

Pilot's Report... Ercoupe

(*Continued from page 40*)

printed with the "N" number of the ship for ready reference when using the radio. And the wing-tank gasoline gage, on the left side near the floor, is illuminated by a recessed light when the nav' lights are switched on. In discussing the fuel system, Redding mentioned that the wing tanks are now vented *internally*, thereby permitting complete scavenging, or use, of their entire 18-gallon contents. Another tank, holding an additional 6 gallons, is located between the firewall and instrument panel and is equipped with a wire-type sight gage. An engine-driven fuel pump transfers the gasoline from the wing tanks to the fuselage tank. Redding stressed the point that when the wing tanks are empty and the first of the 6 gallons has been used from the forward tank, the sight gage will drop to the ½ mark, thus giving a positive indication of empty wing tanks and delivery of fuel from the forward one.

Upon completion of our ground tour, Redding turned us over to Bob Sanders, genial president and general manager of the Ercoupe sales organization, who was to be our demonstration co-pilot during the flight check of the 1950 two-control Ercoupe. While getting into the *Club-Air*, Sanders reported the airplane had a legal gross weight of 1400 pounds, including two persons, 75 pounds of baggage (or a small child in the jump seat) and full tanks (24 gallons). This tankage permits a bone-dry, no-wind range of 430 miles at 110 mph, or 530 miles at 80 mph.

The electric starter is engaged easily by means of a "pull" handle located near the bottom of the instrument panel. After a brief warm-up period, we found that taxiing this new Ercoupe is a pleasure. Except at very low speeds, wheel pressures required for turning are light, almost like an automobile. However, this ease of steering combined with the excellent visibility over the nose and to the sides tends to induce excessive taxiing speeds. The disc-type brakes, operated by a single foot pedal, are very effective and, because of the tricycle gear, can be applied as heavily as desired.

After a routine engine check at the end of the 1500-foot paved strip, a take-off was made into a crosswind of approximately 15 to 20 mph. Humidity was high and the temperature was low—a wet, chilly day with not too much lift in the air. We were nine gallons light and carrying no baggage, so became airborne about one-third of the way down the strip. During this and subsequent take-offs, we made no attempt to "horse" the airplane off, desiring rather to let it get off in a manner most likely to be followed by the average pilot. Too, we followed Sander's suggestions and kept the nose-wheel definitely on the ground to maintain "steerability" in the crosswind until we were sure the plane had sufficient speed (above 50 mph) to stay aloft once it was pulled off the runway. We believe the published gross weight take-off figures of 570 feet in no wind and with standard air are quite accurate, of course depending on pilot ability.

From a standing start, the ship was off the ground in about 12 seconds. One minute and 58 seconds later we were at an altitude of

(*Continued on next page*)

Pilot's Report... Ercoupe

(*Continued from page 43*)

1,000 feet, which works out to just slightly better than 500 fpm rate of climb at the recommended best climb speed of 65 to 70 mph, at 2175 rpm (full throttle). Climb to 2,000 feet was better, being around 550 fpm. However, along with the air being substandard, there were numerous gusts which decreased climb efficiency and made it almost impossible to check the rate of climb accurately. Too, the airplane we were flying was equipped with a Met-L cruising prop. Published performance figures indicate 560 fpm and we'll settle for this as being correct.

At the 2400-rpm cruise recommended by Sanders, the airspeed indicated between 110 and 113 mph at 2,000 feet. Even though we could not check this because of rain in the timing-course area, we're inclined to agree with the 110-mph cruise given on the performance data sheet. The additional 3 mph was possibly due to a "high-reading" airspeed indicator but we are more inclined to think it was the result of the cruising prop. At this speed and rpm the ship maintained altitude with a slightly nose-low attitude and there was a noticeable lack of vibration.

It was interesting to note that a full throttle and with full back trim but with no manual fore or aft pressure applied to the wheel, the airplane maintained 60 mph, a speed well above stall. Although application of a noticeable amount of back pressure (into the spring-loaded range) reduced the speed to 50 mph, the Ercoupe still continued to climb. As we applied more back pressure, to a full-back position, the nose assumed an attitude of about 35°. As the speed dropped to an indicated 45 mph, the ship stalled and started a decisive roll towards the right, probably due to induced aileron drag. However, while still holding the wheel all the way back, we found it possible to level the wings by rolling the wheel to the left. After picking up speed again, we pulled the Ercoupe into an abrupt "whipstall" attitude. When the stall occured in this extreme attitude, the nose dropped straight away without any tendency towards yaw or roll. Breaking the stall was quite simple—jus a slight release of back pressure and we were flying again.

Checking minimum speed and power needed to maintain altitude, we found the *Club-Air* would hang on at 55 mph, with 1550 to 1575 rpm, and lateral control was quite responsive. Not having a power-load curve available, we wouldn't hazard a guess as to the power output at this rpm but it does indicate the ship can be kept aloft quite a long time while looking for a suitable forced landing spot in the event of partial power failure.

Next, we checked the power-off rate of descent at safe minimum flight speed (sufficient for full lateral control). At an Indicated 50 mph in fairly gusty air, the ship descended between 500 and 700 fpm, for an average of 10 feet per second. Thinking of night forced landings over unknown terrain, we asked Sanders whether the gear could withstand the impact load imposed by a landing from such a descent. His affirmative answer was based on reports of Ercoupes landing under similar emergency conditions without damage. Actually, it probably isn't important whether the gear gives 'way or not, so long as the rest of the airplane stays together—and we feel quite sure it would.

With power-off stall characteristics next on our check list, we pulled throttle and eased back to the spring-loaded "cushion." Considerable pressure was required to hold the wheel in a full aft position. As the speed dropped slowly past the 50-mph mark and hit 45, there was a light indication of stall and the nose rocked slowly downward to a position somewhat below the horizon, then started upward again. During this mild oscillation, the wheel was kept full back but lateral control remained excellent throughout the maneuver. Because of this mildness and sureness of control, the high rate of descent resulting from such a maneuver goes unsuspected for quite a while. Too, quite a bit of altitude is lost when the nose is dropped in recovery. This may account for the reason some Ercoupes have landed abruptly and short of the runway after being brought in at too slow an approach speed.

The last maneuver checked in the two-control model was a power-on stall in a steeply banked turn. Maintaining altitude, we finally obtained about a 70° bank — it appeared to be almost vertical. After about three complete turns, the airplane stalled with the wheel all the way back. As it did, the ship whipped over to an opposite bank of about 35° but unstalled itself during the partial roll. Although this might be somewhat breathtaking to a student, it did not appear to us to be particularly dangerous, and we lost no altitude.

On the downwind leg of the pattern, we throttled back and set the trim full back, an easy operation accomplished with one hand. With very little pressure on the wheel 65 mph was maintained until just over the boundary of the field. At that point, we began our flare-out but forgot about the spring-loaded "cushion" and failed to get the wheel full back, consequently touching down on all three wheels at practically the same moment. On the next landing, made intentionally almost due crosswind with gusts up to 30 mph, we touched the main gear on first and then had to be reminded by Sanders to release the wheel so the nose gear could take hold and maintain a straight path down the runway. We're sure a person learning to fly on a two-control Ercoupe would have no difficulty aquiring this landing technique.

The following day we went back out to the field to fly the three-control Ercoupe with Chief Test Pilot Thommy Thompson who, incidently, has been wanting a three-control Ercoupe for a long time. Although he'd completed almost all the paper work necessary for final certification of the three-control model, we had to wear chutes for the flight check. Once in the ship and with the engine warming up (the day was colder and much more gusty than the previous one), Thompson went over a few of the details involved in the change-over to three-control. First of all, although both the two-and three-control Ercoupes have the same respective aileron, rudder and elevator displacements, the rudder and ailerons are completely disconnected from each other in the three-control design. Also, the brake pedal is eliminated to make room for installation of the welded stell-tube rudder pedals. Brake application is accomplished by means of the parking brake. This we didn't particularly like because of the heavy pull required. When we mentioned this to Thompson, he reported they were working on a lever-action handle which would probably be put into production if sales warranted such re-design. He also mentioned that anyone who wanted to change older model Ercoupes over to three-control could do so with the $150 kits soon to be made available.

From the moment we started taxiing out for take-off, we were impressed with the ship. Steering is accomplished either in the conventional Ercoupe way by using the wheel; by rudder alone at moderate speeds, or by a combination of both. The take-off, in a strong 30-mph crosswind, was executed easily by keeping the wheel rolled slightly to the windward side and use of downwind rudder. To keep the nose wheel from skidding, we applied just enough back pressure to take the load off the tire. The ship came off nicely and responded quickly when we ruddered against the gusty air. Duplicating the two-control check procedure of the previous day, we found no differences in climb and cruise performance. Straight-and-level flight in the prevailing rough air, however, was where the three-control job really pleased us. Yaw, due to gusts, was decreased by rudder use to a point comparable to any other stable conventional airplane, so much so that we found it possible to fly "hands off" for long periods of time. In the stall tests the airplane responded just as well as the two-control model.

Thompson then took over and showed us the "clincher." . . . . At, 2,000 feet he applied full throttle, pulled the Ercoupe into a power stall and then proceeded to keep the wheel all the way back. As the nose oscillated up and down, he kept the wings level with rudder and called our attention to the altimeter. Instead of gradually losing altitude from each "dip," the ship lost only as much as it had gained during the previous swing up and we continued to remain at or above the 2,000-foot level.

On the way back to Erco Field, Thompson suggested we drop into a deserted Navy strip that was right on our course. Coming around the field, we noticed the sock was standing almost straight out, indicating a good 45° to 50° crosswind. Thompson made the first approach, crabbing to stay lined up with the runway. Just before touching down, he ruddered the ship straight and we landed perfectly. During the landing roll, he demonstrated how easily either the wheel or the rudder could keep the Ercoupe rolling straight down the runway. Then Thompson suggested we try a take-off *downwind*, crosswind! Except for a longer ground run, the ship got off just as easily and nicely as it had in the previous head crosswind take-offs, and the stability was excellent throughout!

Our reasons for preferring the three-control Ercoupe rather than the two-control design are these: improved crosswind take-off and landing characteristics; elimination of almost all yaw effects in rough air; improved stall characteristics and control and low speeds and, lastly, an intangible sense of a more solid "feel" to the airplane. But regardless of which control type is desired, the Ercoupe is a darn nice airplane!

The price? . . . . The *Club-Air* lists at $3995, plus another $150 for three-control - and it's worth it.

Skynight Rider

(*Continued from page 38*)

field on-the-deck at "over 400 mph" and pull up in a tactical approach. Then you hit the large hydraulically operated dive-flaps that fan out from the aft section of the fuselage to slow your speed, drop the gear and flaps and head for the runway.

However, at the Los Angeles International Airport we make very staid, conservative approaches. I usually try to stay sharp on my spot-landing technique by picking a point on the runway where I plan to touchdown. I'll close the throttle to idling position and see how close I can come to that spot. There's no danger of cooling off a jet engine to the point where it will "load up" and cease to function, so you can make your landing approach with an absolute minimum of power.

Since the ship is designed for carrier operation, the landing speed must necessarily be slow. Control is excellent at these slow speeds and a stall-warning indicator is provided. Visibility is very good, just like a transport, and the pilot can see the ground almost directly in front of him throughout the landing.

The side-by-side seating arrangement on the *Skyknight* has many advantages. Communication between pilot and radar operator is not limited to inter-phone. If you get into a jam, you're a lot better off being able to look at a person and point or talk into his ear than you are when you have to talk to him over the phone.

The flat windshield probably makes the supersonic designers shudder, but a lot of testing was done and the flat design checked-out to have the lowest possible drag to meet gun-sighting and night-vision requirements.

A special system of cockpit lighting prevents glare. Letters and numbers are etched in transparent lucite on instrument panels and consoles and are lighted from behind with a red light. Failure of a bulb will not cause loss of the gage since remaining lights continue to illuminate all panels.

Douglas-developed gear and flap handles are shaped like the units they control. The landing gear is fully hydraulic and may be dropped by its own weight in case of a hydraulic failure. The *Skyknight* has an auxiliary tailwheel to prevent damage to the aft section of the airplane during extremely rough landings.

The powerplants are installed in the fuselage so that they may be removed with a standard bomb hoist and replaced within an hour!

Most night-fighters and all-weather interceptors are converted day fighters with radomes attached. The *Skyknight*, however, was designed strictly as a night fighter. While it isn't quite as fast or maneuverable as the day fighters because of that nose full of radar, it's a jack-of-all-trades fighter and a master, too. It reaches full performance without any tricks and it is simple to fly. A pilot doesn't have to be a "hot rock" to handle the F3D.

Progress

America now operates about 100,000 private airplanes. Of these, 32,000 are used for business purposes.

Tie-Down Traces

(*Continued from page 39*)

are a bit quicker on the Sahara. And even when airports are located in more favorable communities, it does not mean that the dust problem can be ignored. Airborne dust is everywhere, and given time will collect on and in any parked airplane in sufficient quantities to cause trouble.

There are ways, however, in which danger from airborne dust can be greatly minimized. The most important efforts along this line are in engine protection. The exhaust ports and intake ducts of all engines offer direct access to the interior, and the dust entering through these orifices will settle on the oily surfaces of pistons, cylinder walls, valves, cams, bearings and journals. When the airplane has been parked for a considerable period, the gradual accumulation of such dirt can become very destructive during subsequent operation.

Do not place too much reliance on canvas engine covers. They offer good protection for the engine exterior, and ample over-all protection for short periods, but during prolonged inoperation, the finer particles of dust will find their way beneath the cover and into the engine ports. Cooling and warming of the engine during day and night temperature cycles will contract and expand the air in the crankcase, causing a breathing action which aids in drawing dust into the engine.

When the airplane will not be flown for several days, or when dry, dust conditions are prevalent, small covers for the various intake and exhaust ports should be provided. These may be simple elastic-necked slip-on covers which may be re-used, or any thin sheet material such as oilcloth or pliofilm held in place by tape. It requires only a few minutes to install these covers on the exhaust stacks, air intakes, breathers and vents, and they are just as easy to remove prior to flight.

Adjustable pitch or constant speed propellers should have the hub mechanism protected by a boot that fits tightly around the hub. When the powerplant includes a supercharger, covers should be provided for the air intake and bypass gate openings. When the airplane has not been flown for a considerable time, all dust gathered between the cylinder cooling fins, on the crankcase and various accessories, and on the ignition harness, should be cleaned away prior to removing the protective dust covers. A compressed air hose, when available, is excellent for this purpose, though a stiff-bristled brush or hand-operated air pump may be used.

Though less liable to damage than the engine, the fuselage, wings and control surfaces of outdoor-parked airplanes should be protected as much as possible from windblown dust and sand. Moving parts such as cowl slides, control hinges, flap mechanisms, pulleys, and bearings, should be cleaned occasionally to remove gritty substances. This is important both to prevent wear and assure easy operation.

Special attention should be given to lubricated parts where oily films will aid the gathering of dust. Clean all such parts frequently, and keep subsequent lubrication to absolute minimum requirements. Never apply enough oil to cause running. Oil is extremely harmful to doped fabric, and oil runs across any surface will gather dust rapidly. Oleo struts by their very nature provide an oil film for dust collection and should be covered with a protective boot. Such boots, when well fitted, do not interfere appreciably with aerodynamic efficiency.

Plastic cabin and cockpit enclosures and windshields are very susceptible to abrasion by windblown grit, and the transparency of these components will soon be affected by minute abrasion marks scratched into the surface. A snap-on windshield cover, or canvas tarpaulin drawn completely over the enclosure becomes a "must" to prevent this occurrence when airplanes are parked outdoors. The same protection will prevent discoloration and deterioration caused by direct exposure to sunlight.

When the airplane has been forced to sit through a dust storm, or a long period of dry, dusty weather, the interior of the wings and fuselage should be inspected prior to flight for accumulations of dust that may interfere with balance, or free working of the various controls and pulley cables. Such inspection is necessary only in extreme cases and after dust conditions have been unusually severe, but it *can* happen.

The second major enemy of the outdoor-parked airplane, moisture, is in many ways more insidious than dust. Dust is something you can see, clean away, and note the damage it has caused. Rot and corrosion caused by moisture may seriously weaken a critical component without its being seen.

Rainfall is but a minor consideration in the effects of moisture on the unprotected airplane. Air humidity in conjunction with changing ambient temperatures, and continuous nocturnal dewfall are a much greater hazard. The danger from moisture varies somewhat in different localities due to various degrees of atmospheric pollution. Industrial areas and coastal regions contain many atmospheric chemicals that condense with the moisture on various plane surfaces. Other aircraft materials require only the presence of moisture to start a chemical reaction. The rusting of unprotected iron and steel parts is an illustration in this conjunction.

Minus hangar protection, the airplane owner must do everything possible to minimize deterioration caused by moisture. If he fails to do this, rotted wood members, decayed fabric, crazed dope, and various forms of metal corrosion will eventually result in costly repair bills. Moisture is conducive also to fungus growths such as mold on wooden components, fabric, insulation, etc.

The principle weapons used in combatting moisture deterioration are the paint brush, chemical dehydrating agents, cabin and cockpit covers, and the same close-fitting engine covers used to keep out dust.

When the airplane will not be flown for a lengthy period, and if moisture conditions are prevalent, use of a chemical dehydrating agent in certain places is recommended. This agent absorbs the moisture from the air before it can attack the surrounding surfaces. One commercially available compound known as Silica-Gel comes either in small porous bags or in dummy spark plugs. A bag of this compound placed in each engine opening prior to applying the protective covers, and replacement of the spark plugs with the dummy dehydrating plugs, will keep the interior of the engine dry.

Many types of surface-finishing materials are available for coating airplane parts to protect them from moisture. Paints, varnishes, lacquers, rust preventives and many new plastic film materials will provide an effective barrier between atmospheric moisture and the surfaces on which they are applied. The principle factor in all cases is to maintain the film in good condition. When checking or peeling starts, remove the old film and apply a new one at once. Follow the manufacturer's directions carefully in using these protective coating materials, and be sure that you are using the right material for the job at hand. A poor job gives poor protection, and will result in having to do the job over at any early date.

Keep all fabric surfaces doped and taut at all times. If an accidental tear or puncture occurs, repair it immediately. Keep transparent plastic enclosures clean, using a recommended plastic cleaner. The dirt may contain chemicals that will react with the plastic and cause crazing or discoloration. Keep control cables and pulleys covered with a light film of rust preventive oil. Maintain a good paint coating on all metals subject to atmospheric corrosion or rusting.

It is not the purpose of this article to warn against the outdoor storage of airplanes. No person should refrain from purchasing an airplane just because he cannot secure hangar space in which to store it. But there are certain preventive maintenance problems inherent in outdoor storage which must be recognized and worked out. Fortunately, neither a great deal of time or money is required to solve them all.

The greatest danger, perhaps, is that many pilots fail to recognize that these outdoor-storage dangers exist and, therefore, fail to take proper preventive steps. But in this event, they'll soon realize their error. Those outdoor gremlins are publicity seekers of the worst type, and will soon make their presence known.

BUTTERCUP was built in 1938 by racing pilot Steve Wittman. It is powered by 85-hp Continental, cruises at 130 mph, lands at 30 mph. There is also a four-placer

Air Report on Far East

(*Continued from page 42*)

to stop and *hold off* any enemy onslaught. The Fifth is on a combat footing. Our aircraft are well dispersed over the Japanese islands, and constant day and night fighter patrol by the Fifth, plus radar defenses, eliminates the possibility of another attack of the nature that smashed our Pacific air strength in late 1941.

Fortunately, the rugged Japanese coastline does not permit a great variety of choice of invasion beachheads, especially so along the western coast. The nearest points of land to Japan from the Asiatic coast are southern Korea, lying west of Kyushu and southern Honshu, and Karafuto, just north of Hokkaido. Neither of these are too distant to eliminate mass attack by landing barges, though it is safe to assume that such an attempt in the face of superior Fifth Air Force tactical air strength (plus American Naval forces in the Far East) would be disastrous.

Soviet air strength bordering Japan must be presumed to be considerable; air reinforcements to the Fifth in event of attack could not be excessively delayed. Though there have been few reports of Soviet bombers operating in any sizeable numbers in the Far East, Red fighters are in large number throughout China, Manchuria and Siberia.

Reports from Siberia indicate that Sakhalin Island, one of the infamous Soviet prison camp areas, is being built into a tremendous air and naval stronghold. LA-9 fighters have been operating in China for several months along with other Soviet types, and several Nationalist fighters have been shot down by LA-9's. Swept-wing, white-painted Communist Air Force jet fighters have been observed over Shanghai since early April, and many other Red jet and reciprocating engine fighter types must be presumed to be in service with Communist forces in China. The appearance of Russian warplanes in China may be likened to the situation during the Spanish Civil War—a possible dress rehearsal for Red pilots and a third world war.

Our own radar screens have often reported Russian jet fighters north and east of Hokkaido on numerous occasions. In addition, should war come, we would probably encounter the many captured Japanese fighters (*Oscar*, *Zeke* and *Hank* types have been seen flying with Communist Air Force insignia) now in China, plus the many American types abandoned by the Nationalists in China proper. These include P-38, P-47 and P-51 fighters, C-46, C-47 and C-54 transports, B-24 and B-25 bombers and *Mosquito* bombers, plus whatever American lend-lease aircraft the Russians have sent to Communist forces.

Soviet subs are right now operating out of Tsingtao in addition to Dairen and Port Arthur, and Russia has given Communist China 34 warships.

The average Japanese is strongly concerned over the possibility of war. He is well aware of the fact that without American forces remaining in Japan, his country is ripe for Communist plucking. Since the occupation's beginning, adding to the problems of inflation, unemployment, high taxation, Communist disorders and a host of other domestic woes, the threat of war and Russian invasion has hung over Japan.

There is no question that almost all Japanese would like to be rid of the civil aspects of the occupation, which interfere in all domestic affairs and conceal foreign control over every phase of civil life. The Japanese citizen does not want American forces to quit Japan, but he wishes the occupation were on a military basis with our forces quartered at military installations.

While the U. S. has declared Japan will remain unarmed, and Japan's constitution outlaws participation in war, the question of the Japanese fighting with our arms is one that cannot be avoided.

Today the average Japanese likes the Americans, gets along well with them. In the face of rabid Communist propaganda, the country has struggled from unbelievable devastation back to a 1936 industrial level, is feeding its people and rebuilding throughout the four islands—all with American aid. The G.I., though there have been isolated cases of resentment, gets along well with the Japanese people.

It is not too far-fetched that if war becomes imminent, America may be forced to arm the former Japanese army members to defend their own country and assist in Asiatic operations. There are some eight million potential soldiers in Japan, eight million troops that would greatly fill the gap between our total Army strength and the manpower of the Soviet Union.

(Ed. note: *A word on the atomic bomb: Consensus of opinion is that, with the exception of a Russian invasion area comparable to those of the larger European landings, Japan, where the atomic bomb was ushered into existence before the world as the mightiest weapon of war, will not again witness an atomic explosion. There simply are no objectives in Japan worth the expenditure of this expensive weapon with, as stated, the exception of an invasion beachhead of such size and strength as to seriously imperil our position in Japan itself.*)

Pen-Air

(*Continued from page 29*)

high degree of utilization. Moreover, many authorities have, after a close check of the facts and figures, reported that maximum use of their company airplanes has actually resulted in increased profits.

Parker concurs and keeps its Beech busy. A luxurious Pratt and Whitney-powered model, it is one of the most completely equipped private planes on the airways today. This fact enables the plane to fly when others might be grounded. For example, in February, a month when northern skies are filled, as every airman knows, with 25-pound cakes of ice, Parker Pen's NC 5151 still recorded 63 hours in the air. For economical corporation use, 50 hours is the usual break-even point. With fewer flight-hours per month, executive aircraft become luxuries.

The story of the Wisconsin pen company's preoccupation with the troposphere is, in large part, the story of Kenneth Parker. Son of the founder, revered penmaker George S. Parker, Kenneth was attending Brown University when America's entry into World War I suddenly made classrooms too small for an adventurous youth. He enlisted in the fledgling naval air service and, after flight training at Miami Air Base, was assigned to training officers in tactical maneuvers at Pensacola.

Commanding officer at the Miami base was a wry character, also hailing from Wisconsin, who was destined to become famous in another war as one of the Navy's foremost exponents of successful carrier warfare. But at the time, Lt. Commander Marc Mitscher and Ensign Parker were more concerned with vintage flying boats and sea planes. In 1918, the Navy was using early Curtiss models and the now extinct Thomas-Morse's.

When his service days were ended, Kenneth Parker retained enough affection for the air to consider flying the airmail for a beleaguered postal department. Deciding in the negative, he entered business, meanwhile maintaining contact with the growing fraternity of airmen. There was Eddie Stinson, who came up to Janesville to visit and during a friendly demonstration of flying technique, made a breath-snatching cross-wind take-off on one wheel.

There was Art Goeble, who blazed the air trail to Hawaii in his small plane, the "Woolrock." To make the long South Pacific over-water hop, Art had to stack gas tanks inside his cockpit to such a height that they obscured his vision. He flew the entire distance "blind," and hit the island dead center.

Wiley Post and Harold Gatty and Ben Howard and countless other pioneers swapped tales and discoveries with the Janesville airman. Thus when he rejoined his father in the pen business, Kenneth Parker was ready with a suggestion considered radical at the time (circa 1928) that involved the purchase of a company plane. A high-wing Fairchild cabin plane with a 425-hp *Wasp* engine was selected, and after christening it "Duofold," Kenneth Parker's next move was to pirate a crack mechanic named Bert Hilton from the pen factory. The final staffing problem was to hire a full-time pilot. The choice was Edgar LaParle of the famed Chicago family of pioneer aviators.

Ed LaParle flew the "Duofold" five days a week in one of the most successful promotional programs in U.S. business history. Before the "Duofold" was finally retired, it had given air rides to more than 14,000 Parker Pen dealers and clerks in just about all the 48 states.

Besides the "Duofold," Parker also acquired several other planes through the years. First, there was a sturdy little Fleet Consolidated biplane equipped with a 110-hp Warner. A beautiful, glass-smooth Verville followed, and in it Kenneth Parker made the first airmail delivery of fountain pens to a stationer in nearby Rockford. It happened in 1930 and the story goes that the company "was racing Santa Claus even then!"

Next came a Stinson . . . then a Cessna. That brings Parker to the present hiked-up era of the Beechcraft. Adhering to what is virtually a shuttle run between branch office conferences, sales meetings, and trouble-shooting assignments, operation of the swift transport plane now draws upon the wealth of experience gained from its predecessors. The human factor? Such heavy duty might dismay a lesser man; but the company pilot, a six-foot, angular Oklahoman named R. Lee Haynes, finds the situation admirably suited to his talents. Pilot Haynes learned to fly 21 years ago in hometown Norman, and since that time has flown almost everything but Prince Houssain's magic carpet. He flew the South Atlantic banana belt as a Pan American captain and later, during the war, he flew the treacherous North Atlantic ferry routes for the British Air Ministry.

Forty-seven hundred hours at the controls of multi-engine aircraft alone have taught Lee Haynes to make a flight in the easiest and most economical way possible. A typical week's activity for the lustrous silver-and-gold trimmed Beechcraft goes something like this. Haynes recently picked up a group of three mildly preoccupied manufacturing engineers at the local Rock County airport. Their destination was a small industrial town in central Michigan where a supplier of vital die equipment is located.

An early morning take-off from the 5400-foot runway followed by a quick trip across finger-shaped Lake Michigan placed them in direct contact with the problem. Solution arrived at, the relieved production men were deposited back at Janesville that same day.

Passengers the next day were four office supervisors who were promptly whisked to a city in Illinois in which is located the plant of a cooperating manufacturer. Objective: to inspect equipment and to study operational technique of that organization.

Wednesday meant a day of comparative relaxation for Pilot Haynes, although he devoted a parcel of his time to supervising aircraft maintenance and inspection. Next day things were right back in a hardworking groove as he received a rush call to pick up three key sales department officials. The flight plan called for Parker 5151 to leave the ground at noon to proceed to Baltimore. They were there in time to catch an evening meal and prepare for an important conference scheduled for the following morning with promotion experts of a large department store. Finished with that, the Parker men rounded out the day with several unscheduled calls upon impressed and pleasantly surprised pen dealers.

It was evening of the second day that Haynes pointed the ship's nose at the blinking Rock County field beacon and made his let-down.

Hastily but soundly constructed in the early days of the last war, the field was designed as part of a network of interceptor, bomber and transport bases to ring the industrial heart of the Middle West. In those days, the Japanese had possession of part of the Aleutian chain and pointed a menacing finger at the Soo locks, Chicago and Detroit assembly lines. The little-known air bases lost their strategic importance before they were ever activated due to the swiftness with which the military seized the offensive in the Pacific.

The facilities are there to be used, however, and have paid off in aiding high utilization of Parker's private "airline." Current plans call for a major U.S. airline to operate in and out of the Rock County field with scheduled daily flights.

Aside from obvious savings in travel time and fatigue, and the asset of being able to travel without worrying about timetables or stop-over, there are other reasons why the strictly budget-conscious pen company is willing to pump 87-octane into travel vouchers of supervisory personnel.

Take, for example, the above-mentioned cases. The flying engineers effected a saving in time which, if lost, might have occasioned a production drop-off. In this, and similar instances when precise manufacturing methods call for stopwatch timing, it simply is not always feasible to handle details by correspondence or telephone.

In the case of the office supervisors, the cost factor in merely transporting them to the site of the host firm by other means of travel might have discouraged the trip at the outset. Parker's own office procedures might then have suffered for lack of this additional knowledge, and the loss would have been felt thereafter all through the chain of clerical help.

It is difficult to evaluate such a loss and it is equally difficult to determine what might have been lost to the sales department if their highly seasonal, tightly packed schedule of sales activities bogged down because of slower travel and fewer contacts. Their Baltimore trip was ticked off during the Christmas selling season, busiest time of the year for them. Yet, had these VIP's been unavailable, the highly profitable promotional tie-up would have dissolved.

Allen Center, coordinator of the plane's activities, has this to say about the dollars and cents side of Parker's air operations: "Even when the weather is inclement and is cutting down flight-hours, an all-weather plane such as the Beech can pay its own way compared with other means of travel. Especially when such items as meals, hotel and salaries are considered.

"We have come a long way from this company's pioneer days in aviation with its 110-hp Fleet and its simple needle, ball and compass. Weather flying was a hair-graying experience in those days. Ed LaParle used to 'home-in' mainly by instinct. Nowadays when a sudden squall swings out of the Great Lakes, air travel is still safe and sane due to the use of the latest in navigation, weather and orientation equipment."

By this, Center means the imposing array of dials, boxes and switches which house the Beech's omni-directional range equipment, VHF tower receiver and transmitter,

(*Continued on page 52*)

Canyon Caper

(*Continued from page 17*)

of air from directly overhead that drove us down into the canyon's depths like an explosion in reverse. The controls went dead, the airspeed fell to nothing. I dumped the nose hard, but we still fell level and all sold out. There was no chance in a second's time to initiate a turn and no life in the controls to execute it anyhow. I figured I'd had it.

About 50 feet above the water it began to cushion. We left the pouring funnel of air and, fortunately, the old *Cub's* ability to fly again as soon as you picked up another mile of speed got us leveled off with the nose high, the wing at a critical angle of attack, the tail wheel (I'll swear it) dragging in the water, and the main gear six inches or so above it.

Talk about being up the creek without a paddle . . . Brother! By now the bottom of the canyon was narrow enough to scrape paint off the wingtips, and more crooked than a slot machine in a tourist resort.

If I could have turned time back a few pages and started all over again, I'd have made some interesting changes in procedure.

For instance, if I could have gotten a run at it, and hit this exact spot with the nose down and plenty of forward speed, it would have accelerated all elements—the turns, the short periods of level flight, the slips and skids—to a point where the ship would have steadily built up a reserve and slowly taken us out of the canyon.

Instead, here we were, sold out and no place to go. With the throttle wide open the plane'd climb just about as fast as the canyon. Then, just as we'd picked up a few extra miles an hour, and things'd begin to look alive again, I'd either have to tip the ship up sideways to get between the trees growing out of narrow skirts of sand beneath the walls, or tip it up to a 45° or 50° hair-raising bank to negotiate one of the 180° turns that didn't seem to be bothering the river at all.

The down wing looked only inches from the water, the up wing threatened to scrape the red sandstone canyon wall, and the ship squeaked and shuddered and trembled at the very edge of a stall.

About then the river tired of the monotony and turned abruptly in the other direction. On several occasions the margin was so close that I think 5 more degrees of turn would have spilled us into the turbulent, boiling water that rushed along a rocky bed.

Never did the speed build up enough to get the angle of attack down before another turn would come along.

I decided very early that the first sand bar big enough to hold us was going to get us. But none came along. I'd have pancaked the ship into anything that looked like a "walk-away" landing, but nothing that good came along. It was horrible to fly, worse to land.

Such flying as we were doing was little more than crawling, but there was no choice. And, with the engine wide open once more, the gas consumption had gone back up, the airspeed down again, and it was anybody's guess which would get us first—a tree, the river, a canyon wall, or the end of the gas supply.

Of course each gallon burned meant six less pounds of weight, but the canyon seemed to get steeper as the ship got lighter.

It was a maddening, frustrating situation, fraught with peril for both my passenger and me—and nothing could be done!

The turns of that rock-lined pathway kept killing off our speed and the straight-aways always found me leveling out inches above the water within a half degree of the critical angle of attack. . . .

I had one thing in my favor—lots of time in the plane at high altitude in hot weather where much of the flying is marginal at all times. I had also been doing lots of slow-flight work with students, and so had a fighting chance of maneuvering on that delicate tight wire between the barest maintenance of flight and the breaking point of a stall which would end the whole deal quickly.

If it had lasted 10 minutes, it would have been a nasty experience. If it had lasted half an hour, it would have been hellish. Because it kept on and on until we'd been in that d—n canyon for 60 minutes, never more than 7 miles above the stalling speed in level flight and most of the time within a minute fraction in both level and turned flight, it turned into a nightmare where a kind of hypnosis finally sets in and you detach yourself from the purely mechanical functions of flying the plane.

But even nightmares end . . . you either hit bottom or you wake up. One hour after we'd headed into our canyon caper, we broke out of the narrow inclines into a valley where I began an easy climbing turn. That got us a little more than 15 feet above the water. At 150 feet I leveled off long enough to get the airspeed up to 55 Indicated for the first time in an hour.

After that it was fairly simple. We flew clear out of the canyon and up into that wing-shaking, rough, wonderful turbulent air where it would flip us 500 feet up and then 500 feet down, but always with lots of room to move around in.

Most important, we were back in a land of living people. Farms began to crop up along the fertile Colorado plateaus, and pretty soon I picked an open field near a small town where we landed for gas. When we rolled to a stop by the gas pump, a check of the tank proved we had no more than two quarts left.

That resolved me right then and there to stay away from flying underneath the canyon rims and to never take a cross canyon current for granted. I also promised myself I'd land at some good spot along the way if things ever got too rough and turbulent, rather than try to duck down into a hole which could turn into a grave.

Slow Roll It!

(*Continued from page 36*)

Six major news reel companies were up at my home in Big Bear City when I put on a "crazy flying" show in a lightplane. On a Pete Smith short subject, I looped around a rope suspended between a cliff and a helicopter and nearly scuttled my Stearman by flying into the downwash under the 'copter.

All that a snap roll amounts to is a spin going forward. My introduction to snap rolls is simple. I start the student out with a one-turn spin and then speed up the entry until the maneuver is done in level flight.

Many old-time instructors felt that a snap roll did little to improve a pilot's flying technique, but I've found that when pilots refrain from acrobatic practice, the snap roll shows this lack of practice first. If all you want is a fast rotation, there's no problem, but that split-second positive recovery that requires no re-alignment of the wings takes plenty of practice.

It isn't necessary to load up the airplane with high stresses to obtain good snap maneuvers. I have never recorded more than 5 G's on my *Wasp* Stearman even with quadruple snaps. Occasionally I use a G suit during my air-show act, but I have never noticed any ill effects from prolonged acrobatic flying. Once, however, I did have a student pass out during an English bunt (half outside loop).

I believe that the most important reason for teaching snap rolls is that it illustrates so graphically the cause and effect of high-speed stalls and develops an instant recovery reaction for inadvertent stalls at low altitude. I consider low-altitude inverted flight safer than a heavily loaded steep turn close to the ground.

There is a good deal of difference in the teaching of snap rolls, depending upon the instructor and the type of airplane. Here is how I teach them in a Stearman. For a full snap roll, I like to pick up about 115 mph and I'll go as fast as 140 mph for multiple snaps. Four hundred feet, incidentally, is my lowest altitude for snap rolls.

After I have my speed, I pull the nose slightly above the horizon. Then I keep coming right back with the stick and apply *both* rudder and aileron in the direction I wish to turn. Many instructors do not use aileron in their snap rolls, but I can make a faster, more positive entry by using aileron toward the snap. Once the rotation is established, I neutralize the ailerons. The amount of recovery rudder and the timing of its use depends on the rate of rotation. Positive, but not necessarily full rudder must be used for recovery. If the proper amount of back stick is used on the entry, little forward pressure is needed on the roll-out.

However, don't forget that snaps are spins and positive use of the controls is necessary for recovery.

I believe that the secret of good snap rolls is not to use full-back stick on the entry. Lead into the snap with rudder and aileron for a quick start. If you use full-back stick, you stall the airplane so completely that your airspeed drops down out of sight and you have trouble recovering with any degree of accuracy.

On a half snap roll, I don't use aileron because it tends to pull the ship off course. The maneuver doesn't last long enough to slow the airplane down to the danger point so I use a larger amount of back pressure.

As you get into the finer points of acrobatics, you'll begin to notice the gyroscopic effects of the counter-clockwise rotation of the engine and propeller. Pull back on the stick and the nose will tend to swing to the right. Push forward and it wants to go slightly to the left. This effect is partially gyroscopic and partially caused by an unsymmetrical loading on the propeller.

Vertical reversements—half snaps starting at the top of a steep turn and ending in a steep turn in the opposite direction—are excellent maneuvers to develop high-speed stall reaction.

Snaps from a steep turn to inverted flight are also excellent to teach proper recovery from an accidental high-speed stall that put the plane over on its back. If the accidental high-speed stall occurred from a steep turn at low altitude, it is often better to allow the airplane to continue its snap roll on over to level flight rather than attempt a recovery upside down. This all-the-way-around snap roll recovery was standard procedure in Air Force basic schools in BT-13's.

The next maneuver in my book is the slow roll. In air-show work, I do a "fast" slow roll, but for instructional purposes I usually begin with a half roll and a short inverted flight so that the student becomes accustomed to looking up at the world and keeping his feet from falling off the rudder pedals.

For practice purposes, line up on a mountain top or a prominent cloud and dive to pick up 15 or 20 mph above cruising—after making a clearing turn to be sure that no other planes are in the way. Then pull the nose about 10° above the horizon . . . and over you go.

Feed it in slowly, but use *full* aileron in the direction of your roll. As the wing starts down, there is usually a slight tendency for the nose to swing away from the roll. In a left roll, the nose starts out to the right because of increased aileron drag from the aileron that goes down.

As the roll progresses, this initial left rudder should be replaced almost immediately by right rudder applied smoothly and in increasingly large doses. As the airplane nears the 30° to 45° point, there is a very pronounced tendency for the ship to turn to the left in a left-hand slow roll, and lots of right rudder is needed. As the roll increases from 60° to 90°, this right—or top—rudder is steadily increased to hold the nose of the airplane up as the wings lose lift. Momentarily, the airplane is actually flying on the fuselage.

As the roll progresses past the 90° point and on to the inverted position, right rudder may be relaxed slowly. However, I usually hold some right rudder pressure until I'm far past the inverted position.

It takes forward stick on most airplanes to keep the nose up during the inverted part of a slow roll. Extremely maneuverable planes like the F-80 and the Cosmic Wind will do a beautiful slow roll with your feet on the floor and nothing but aileron applied.

Forward pressure on the stick should be relaxed about the same time that the right rudder pressure comes off. As you come around off your back, you must cross over with your rudders and apply left rudder

(*Continued on page 52*)

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Slow Roll It!

(*Continued from page 50*)

(now the top rudder) to hold the nose up while the airplane is on its side and to prevent the airplane from turning to the right as level flight is approached.

Simple, isn't it? Yet one of the hardest things for the beginner to learn is to keep that aileron in full all the way over. Usually a student will relax aileron pressure where he needs it most—when the airplane is on its side and has the least available lift.

When that nose starts to drop half way through a slow roll, don't "split S" but continue to hold full aileron and roll the ship back into level flight even though you may come out in a screaming dive. The "split S" is a good air-show maneuver, but it has absolutely no value in the perfection of flying technique. The student should learn to roll out automatically from an inverted position for the rather obvious reason that he might have to recover from an inverted flight at low altitude.

For easier acrobatic flying, use the trim tab as much as you can to take the loads out of the stick. When I'm doing acrobatics, I alternate my left hand between the throttle and the trim tab. At the end of a regular air show, I'm so tired from throwing the stick around the cockpit that I frequently use both hands on the controls to finish the last few maneuvers.

The most spectacular acrobatic ride that I've ever made was a piggy-back trip with Tony LeVier in his P-38 during an air show at Santa Maria, California. Tony and I grew up together and he gave me my first acrobatic instruction by lying on the ground and criticizing my maneuvers while I was up solo in an old C-3 Aeronca. That was a far cry from his P-38 air-show act.

After the usual high-speed passes on single engine, Tony concluded his act with a climb to 10,000 feet. Then he would feather both engines, dive toward the airport and pull out right on the deck. I saw 525 mph on the airspeed indicator and I'm sure we weren't 25 feet off the ground—with both of those big fans feathered. Then he'd roll over on his back, fly the length of the field inverted and roll right side up into an Immelman. With the engines still dead, he'd drop the gear with a special electric hydraulic pump, land dead stick and roll up to the announcer's stand. It was a wonderful act.

Low acrobatics for air-show work should be attempted only by professional acrobatic pilots. Nothing makes me more nervous than watching a pilot performing before his hometown audience. Frequently, he'll try maneuvers on-the-deck that he's never even attempted at high altitudes. Remember, low-altitude acrobatic flying ranks with steeplejacking, tight-wire walking and underwater sand-hogging. All are dangerous. All require training, a strict set of rules and special equipment. True, professionals make mistakes, but not as often as do the amateurs. You're as safe as the rules you follow, and as dangerous as the rules you break.

The most difficult maneuver in my act theoretically can't be done. That's an eight-point 180° hesitation slow roll in a half circle. There are two points in this maneuver where you must turn the ship on two different axies at the same time—and there just isn't the control to do it. I practiced for over 20 hours before I finally figured out how to push it over these "dead" spots.

I can do a fair job of acrobatics under the hood, but Johnnie Vasey of Mason City, Iowa, can do all the maneuvers in the book while on instruments. Once we took off together at Rankin's when I was learning instrument flying, and nearly mowed down the control tower. The directional gyro had not built up sufficient rpm's and didn't hold a true heading for take-off.

Whip stalls should be demonstrated somewhere along the line. As the ship slows to a full stop after going straight up, the stick should come all the way back and be held firmly there so that the air pressure won't pull it out of the pilot's hands as the plane slides backwards before the weight of the engine pulls the nose back down. Naturally, the rudders also should be held firmly.

As a pilot gets older and loses some of his natural exuberance, he usually does acrobatics less frequently. A natural development from professional air-show work is test flying where the training a pilot has perfected can be used for the meticulous type of research flying that goes into modern test work. I hope to use the proficiency developed in over 3,000 hours of acrobatic instruction and exhibition work in advanced experimental test flying.

One of the few exceptions to this older-and-not-so-bolder axiom is Roy Cusick, wing-walker and pilot of the 14-foot high-speed glider "Unstable Mabel" in our air-show act last year. At 52, Roy will still stand on the top wing of my re-built *Jenny* while I loop it at 50 feet.

Don't do as I did many years ago and try to teach yourself how to do acrobatics. In those days there were few instructors with good acrobatic training and I wasted many an hour of flying time that I'd earned by wiping off airplanes and selling rides.

Find a good acrobatic instructor—any pilot who has taught in the Air Force primary program—and take extensive dual instruction. Then follow it up with confidence-building solo time at a good high altitude—and not in the vicinity of your girl's house.

You'll be a better all-around pilot with that roll-over experience.

Pen-Air

(*Continued from page 48*)

Bendix automatic direction finder and marker beacon receiver, instrument landing system equipment (ILS), plus anti-ice and de-icer systems. Much of this is not stock with planes of this type, though more and more companies are installing it.

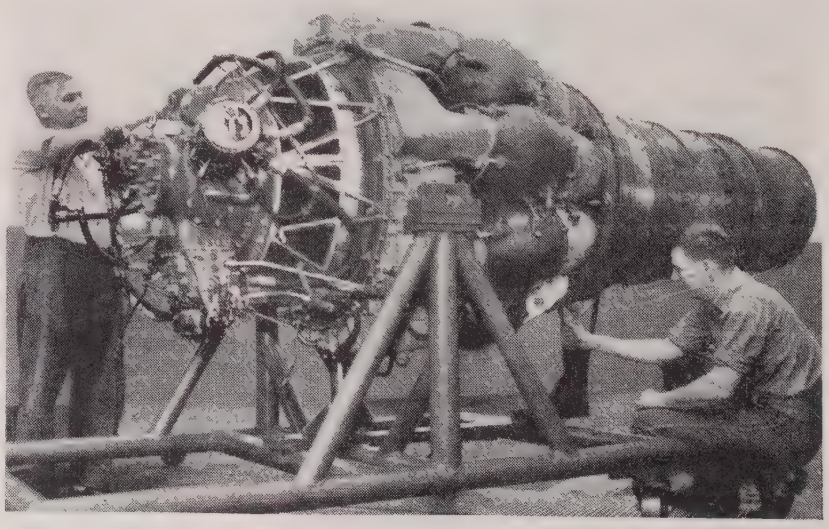
"When the weather is reasonably good," Center continued, "our experience then is that people who like to pick their own flying weather add to the traffic, and the company plane then can do better budget-wise than other forms of transportation."

Operating with near airline efficiency, actual operating expenses of the Parker Beechcraft, which include gasoline and oil, maintenance and other expenses, averaged less than six cents per passenger mile during the most recent six winter months, or about the same as automobile mileage expense.

"When fixed costs such as pilot salary, hangar rental, depreciation and insurance are considered," Center said, "the total cost per passenger mile runs 16 cents. A good thing to remember, too, is that the kind of passenger-miles a company plane skims over comes to much less than auto or rail miles. One authority has figured that the average advantage throughout the country for air-miles over surface miles is about 20 per cent. This should be taken into account when discussing economy for corporation aircraft."

Location, of course, plays an important role in evaluating the use of a business airplane. Janesville itself is a geographic "natural." The town has long been victim to a transportation blockade imposed by Chicago's sprawling rail systems and motor car traffic complexities. While it takes hours—with stop-overs—to pass *through* the "Queen of the Prairie" by rail, or as much as an hour by auto, only four minutes are required to pass *over* it.

This sort of simple arithmetic has long since resolved the problem of "to fly, or not to fly" for busy people at Parker. It looks as though it will take quite some time for them to come down to earth and it's doubtful they ever will.



PRATT & WHITNEY J-48 Turbo-Wasp is called "most powerful jet engine now flying." Its maker, Pratt & Whitney, celebrated its 25th anniversary in July

Know Your IAS

(*Continued from page 27*)

of line cannot collect and send the correct impact air pressure to the indicator, thus resulting in a false indication. Watch out for the fellow who lounges on your pitot-static tube or hangs his coat on it.

Blowing into the pitot tube can result in applying excessive pressure to the delicate instrument mechanism, possibly rupturing or deforming the mechanism in such a way the indicator needle will no longer zero. The impact air pressure that operates the instrument in flight is many times less than human lung power. Probably no pilot can explain what prompts a person to blow into the pitot-tube. With characteristic directness, however, airmen have been known to discourage such "blowing" with the aid of an old-fashioned hand-crank booster magneto. Lacking the booster mag—or in case you tire of the fun and decide to spend a night at home, a cloth cover for the pitot-static tube is a good idea. This may be made from any heavy fabric and sewn up in such a way as to permit its being slipped over the tube. A couple of red streamers sewed to the pitot cover will serve as a reminder to remove the cover before flight. The red streamers will also call attention to the pitot tube and prevent someone from carelessly impaling himself on it. The cover will prevent dust and small insects from entering the lines and will protect the instrument from the effects of wind if the ship is tied down instead of being hangared.

If inaccuracies are suspected in the airspeed indicator, a simple and systematic checking procedure, beginning with the pitot tube, will soon localize the trouble.

Pitot-static tubes are so constructed as to rarely give trouble due to collection of dust, oil or water. Nevertheless, it is wise to begin the check by blowing out the lines. Disconnect the lines at the back of the airspeed instrument. If the static line is also connected to the altimeter or other instruments, they also must be disconnected. If drains are provided in the pitot-static lines, they should be opened, then the lines blown out with compressed air or a tire pump.

This done, reconnect the lines and test them for leaks. Leaks often are responsible for erratic airspeed readings. It must be kept in mind that these lines are subject to vibration fatigue and possible cracking. Since the lines are often enclosed in the wing they can only be completely inspected at the time of covering.

Place a length of rubber hose on the pitot tube (which has the forward end open) and, using the mouth, gently apply enough pressure to cause the airspeed indicator to read 100 mph. A safer method of applying pressure would be to roll a length of soft rubber tubing into a tight coil, then pinch off the tube to hold the pressure on the instrument, and watch the indicator needle. If the pointer reading drops, a leak is indicated either in the main line or connections or the instrument proper.

After checking the pitot for tightness, repeat the leak test. If a leak is still indicated, disconnect the pitot line at the instrument case and connect the rubber tube directly to the fitting at the instrument. Apply pressure directly to the instrument, pinch off the tube and, holding pressure on the instrument, check for a drop or decrease from the original reading. A pointer drop under these circumstances indicates a leak in the instrument. This means complete replacement of the unit or overhaul.

If the pitot line and instrument connection check satisfactorily, perhaps there is a leak in the static side of the system. Although some lightplanes vent the static connection of the instrument into the cockpit, it is desirable that the static connection (marked by "S" on rear of instrument) be made to a regular static line, and that all connections be tight.

The static line may be checked by applying suction at the static tube using the tube-and-mouth method. Again—exercise caution, applying only enough suction to cause a full-scale deflection of the airspeed needle. Then pinch off the tube and watch for needle movement. The rate of drop should not exceed 5 mph in one minute. If a leak is indicated, inspect the flexible connections at the back of the instrument. If the flex lines are hard or show signs of deterioration, they should be replaced.

Static leaks also may occur at the instrument case, at the cover glass, or in the cases or connections of the other instruments which are connected to the same static line. To check the case of the altimeter for possible leaks, use three short tubes and a T connection. Slip one hose on the static connection of the altimeter and one on the pitot (P) connection of the airspeed. Apply pressure to give a full scale reading on the airspeed, and then pinch off the tube. The airspeed reading should not drop faster than 5 mph in 10 seconds. Faster movement indicates an air leak in the altimeter case, probably at the cover glass. In any event, if the leak is localized the instrument case do not attempt to repair it. Leave that job to an authorized instrument repair shop.

Pointer vibration may be caused by troubles entirely outside the airspeed system. Poor shock mounts on the instrument panel may be the cause. Check the shock mounts for deterioration. This deterioration will show up as cracks and brittleness of the rubber in the mount.

A straight tubing-to-gage conection may be transferring line vibration to the instrument. The connection should be made vibration-proof by using a short length of flexible tubing between the line and the instrument.

The forward alignment of the pitot-static tube should also be checked since an inaccurate reading is bound to result if this tube is damaged or out of alignment.

These simple inspections and precautions will take care of most minor airspeed ailments. Other obvious troubles such as a pointer that will not zero or a cracked cover glass necessitate the attention of a reliable instrument shop or complete replacement of the instrument. Remember that the safe pilot depends upon his instruments as well as his own good judgment.

Who has seen the wind?

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Dilbert

(*Continued from page 33*)

a. You will need more runway to get off.

b. Your rate of climb will be less.

c. Your approach will be faster.

d. Your landing roll will be longer.

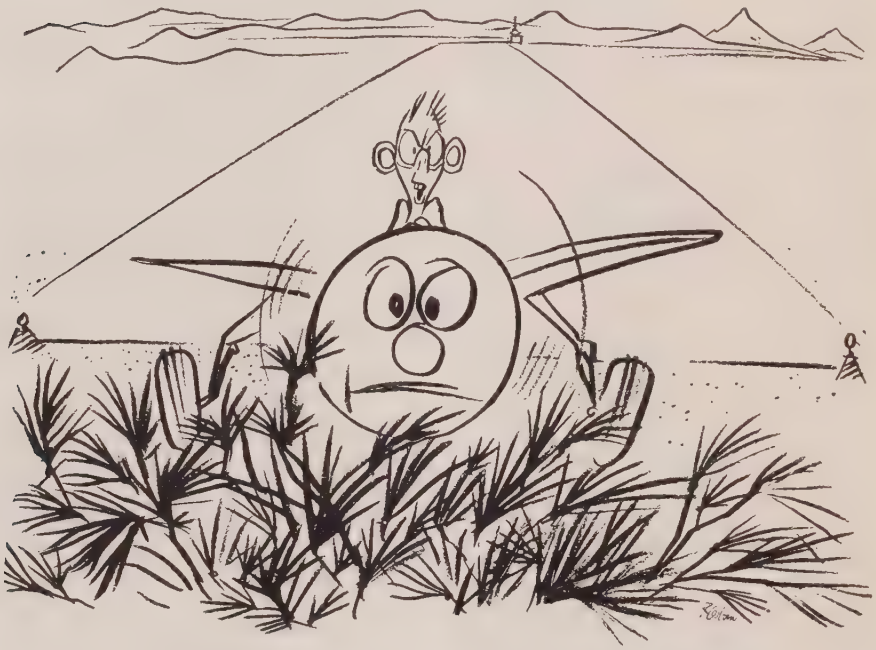
3. If both runway and temperature are higher:

a. You will need *still more* runway to get off.

b. Your rate of climb will be *even less.*

c. Your approach will be *even faster.*

d. Your landing roll will be *even longer.*



"Portrait of a phool and his plane fresh out of runway"

Let's Look At The Record—The CAB report of aircraft accidents for last year has just been issued. Even though the only kind of figures you never get tired of is female, this 45-page analysis is recommended study for all aviators.

It is full of valuable information and dotted with sign posts to warn unwary pilots where dangers lurk. For instance, it shows that "pilot error" is still the primary cause of 75 per cent of all accidents; then goes on to break this down into specific categories. The first six, in their order of frequency, are:

1. Misjudging distance.
2. Operating recklessly.
3. Failure to maintain flying speed.
4. Selecting unsuitable landing terrain.
5. Misusing brakes and flight controls on the ground.
6. Improper leveling off.

While this doesn't justify your slighting any of the other 13 categories listed, it does show where special attention is needed.

The most heartening thing about this report concerns collisions with other aircraft and stalls. While they still are the two most dangerous-type accidents in which to be involved, their total number was considerably under that for the previous year. As regards stalls, the CAB was of the opinion that this improvement was due to the special emphasis which has been placed on stall accidents, plus stall-resistant aircraft, stall-warning indicators, and development in crash protection.

Of course, this report is merely the statistical analysis of the average pilot. You may not be average; your most glaring faults may not even be mentioned. To illustrate the fallacy of complete reliance on this "average" business, take the case of the 10 girls, nine of them married, one unmarried. "On the average," each of the nine is 10 per cent unmarried, while the unmarried one is 90 per cent married!

As long as the primary cause of 75 per cent of all accidents is "pilot error," it damn well behooves you to read everything, seek out expert counsel, analyze your own faults, and maintain *eternal vigilance.*

Know Your Lights—Everybody remembers Paul Revere's lantern signal "one if by land and two if by sea." You'd be surprised how many aviators are unfamiliar with certain other signals, far more important to them. Specifically, beacon identifying signals. Let's review.

a. Alternate white and green flashes—a lighted land airport.

b. Alternate white and yellow flashes—a lighted water airport (seadrome).

c. Alternate white and red flashes—a landmark.

d. White flashes with auxiliary directional red coded flashes—a Federal airway.

e. Red flashes—a hazard.

Seth's Safety Quiz—**1.** With the exception of authorized formation flying, what is the minimum distance aircraft must keep from each other in flight?

2. In the event of fire, should you open your window or overhead escape hatch?

3. Why should pitot tubes be covered when airplanes are not in flight?

Safety Quiz Answers

1. 500 feet.
2. Only to bail out. An open hatch will draw smoke and flames into the cockpit and jeopardize control of the aircraft.
3. Accumulated moisture in the lines may cause erroneous airspeed, altimeter and rate-of-climb indications.

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Air Traffic Control Problems for Pilots discussed by Fed. Airways Planning Chief . . . . . page 59

NAVICOM

NAVIGATION, COMMUNICATION

ARC's Navigational Receiving equipment for private planes

Pilot-Engineer reports on flying with VHF Navigation and Communication equip't . . . . page 60

Edited by Col. N. F. Silsbee

CAA Requests Pilots Talk to Tower Ops

"We don't care how you say it. Just talk to us, please!"

Disturbed at reports that private pilots hesitate to use their radios in dealing with CAA airways employees, D. W. Rentzel, Administrator of Civil Aeronautics, has asked all pilots to feel free to talk to his communicators and traffic controllers at any time, and in any way.

"It's strange," said Mr. Rentzel, himself a flyer with several hundred hours experience, "but we find many flyers who are afraid to use their radios for fear they might use the wrong words, and be reprimanded by the CAA. Nothing like that could possibly happen. Our communicators understand any kind of English . . . and they'll answer any kind of English.

"The 'patter' built up over the years for air communication saves time, and helps to standardize service, but it isn't required. The casual way experienced pilots throw this patter around probably has made beginners self-conscious.

"Actually, any pilot can pick up his transmitter and say 'Hey, look! This is Joe Doakes, and I'm going to Louisville. How's the weather over there?' and he will get exactly the same kind of service anybody gets.

"Of course, when you do learn the short and standard procedures, it will help speed up our services to you and to others and avoid possible misunderstandings.

"We want safe flying. Radio promotes safety. Let's all use it in routine as well as emergency cases."

Radiophone Procedure ▶ When contacting an airways communication or air traffic control center by radio from your plane, or vice versa, the following is the latest procedure:

1. Use the words "THIS IS" instead of the word "FROM."
2. Use the word "OVER" instead of the words "GO AHEAD" to indicate your transmission is ended and you expect a response from the tower.
3. Use the word "OUT" when your conversation is ended and you wish no response.
4. Use the phrase "SAY AGAIN" instead of the word "REPEAT" when requesting a repetition.
5. Use the phrase "I SAY AGAIN" instead of the phrase "I WILL REPEAT" when a repetition is being given.

Example: St. Louis Tower
THIS IS Stinson N 1234 K
Message for you
OVER

Response: Stinson N 1234 K
THIS IS St. Louis Tower
Send your message
OVER

Air-Nav, ATC System for All Pilots

Chief, Planning Staff, Office of Federal Airways points out pilot responsibility

By Joseph Blatt

The framers of the RTCA SC-31 Report visualized a system of air navigation and traffic control that would be of great benefit to all users of the air space. By all users we mean the military pilot, the air-carrier pilot, the commercial pilot, and what is becoming an increasingly important subdivision of the commercial pilot category—the executive pilot, and finally, the private pilot using smaller equipment.

Any system of traffic control must be premised on the assumption that clearances will be granted on a non-discriminatory, non-professional basis. However, even though the premise of non-preferential clearances will be adhered to, the benefits that a pilot will derive from any complex system of air navigation and traffic control will be directly proportional to the individual skill of the pilot, his familiarity with procedures and regulations, and the airborne electronic equipment installed in his aircraft. A common system of air navigation and traffic control implies common responsibilities as well as common benefits. As a group, the executive pilots contribute to the efficient operation of air traffic control through their extensive aviation background, experience and knowledge, as well as by their willingness as a group to adhere to ATC (Air Traffic Control) instructions.

Pilot Proficiency ▶ The CAA is aware of the professional proficiency of the executive pilots and desires to publicly acknowledge the fine spirit of cooperation this group has exhibited. The flight activity of the executive pilot includes a great amount of cross-country operation which results in the extensive use of Federal airways traffic control communications and navigation facilities. Knowing that the executive pilot will adhere to clearance patterns, the CAA Traffic Controller does not hesitate to grant him a complex clearance that will expedite the flow of traffic along an airway or at a terminal. This confidence in the ability of the executive pilot to execute a clearance is certainly a highlight in today's aviation picture.

Pilot Mistakes ▶ It must be pointed out, however, that human nature being what it is, the isolated mistakes of a few always reflects upon the reputation of the group with which they are associated. There have been instances where pilots of executive-type aircraft have failed to familiarize themselves with air navigation facilities and traffic control procedures, thus causing unnecessary delays to themselves and other aircraft and adversely affecting the reputation of an exceptionally proficient group.

In spite of the generally accepted principle that shortcomings and "don'ts" should not be stressed in modern teaching techniques, I would like to list nine pilot actions or lack of actions that have caused air traffic control the greatest headaches. These are shortcomings found among all classes of pilots.

(1) Failure of the pilot to file an IFR Flight Plan until the last moment before IFR conditions are encountered. This makes ordinary advanced planning by ATC impossible.

(2) Failure of the pilot to report his position over all designated reporting points. This failure results in delays and uneconomical usage of air space.

(3) Failure of the pilot to advise ATC of all deviations from the flight plan as originally filed. Obviously, changes in speed and even minor route deviations will throw air traffic control estimates off and may result in inadequate separation.

(4) Due to navigation errors or poor pilot technique, pilots do still get lost. This necessitates emergency handling procedures by ATC and results in excessive delay.

(5) Some pilots are negligent in adjusting their altimeters to the proper settings enroute. This negligence may result in inadequate vertical separation in spite of ATC planning.

(6) Many pilots do not recognize the limitations of the separation clearances provided by ATC. This clearance provides pilots with adequate and safe separation only from other aircraft on IFR flight plans. VFR flights operating on top or through other VFR conditions are not necessarily known to ATC. It must be remembered that it is the direct responsibility of any pilot flying in VFR conditions, whether or not he is on an IFR Flight Plan, to be on the lookout for other aircraft and avoid a collision.

(7) Many pilots are not thoroughly familiar with radio failure procedure. This lack of familiarity with procedure causes unnecessary systems delay.

(8) Pilots still blunder into heavily congested areas such as the New York Terminal Area without adequate radio equipment needed to follow the patterns described by the ATC clearance.

(9) Some pilots are still not familiar with the true approach procedures in spite of the widespread dissemination of charts and tables.

Many accidents could have been avoided if the pilot concerned had been thoroughly prepared for the flight, or if the aircraft transmitter had been more completely equipped with regard to radio transmitting frequencies.

A knowledge of the contents of the current Airmen's Guide, the Fight Information Manual, and Part 60 of the Civil Air Regulations—specifically the parts dealing with air traffic control procedures, minimum enroute altitudes, elliptic holding patterns, radio communications procedures, and instrument approach procedures, would greatly assist any pilot in his efforts to adhere to Air Traffic Control instructions and to take advantage of the services offered by the Federal Airways facilities.

FEDERAL AIRWAYS' J. Blatt, Chief, Planning Div. gives talk on executive pilots and air traffic control at CAOA annual forum, Washington

Pilot Reports Use of VHF Radio

Flight in Twin Beech Equipped with Bendix NA-3 VHF trans-receiver proves set utility

By Wilbur L. Webb
Dir. Engr., Bendix Radio

Practically all pilots have used low frequency ranges to navigate and two-way radio for communication with airway stations and towers. A majority also have used ADF and are familiar with the ease with which they can continually locate themselves and know which direction to fly. However, pilots with experience on VHF equipment are still in the minority, although fortunately, the number is increasing quite rapidly.

I am writing this from a pilot's viewpoint, especially that of the private or executive pilot. In doing so, I am purposely forgetting my main job is that of an engineer concerned with aviation, electronic and radio equipment. For the time being I'm just an amateur pilot describing my own experience in using the VHF equipment available today.

Radio Equipment ▶ The flight I am about to describe was made in Bendix Radio's Twin Beech in which a plush installation of the latest NA-3 VHF Navigational system, including TA-18 25-watt VHF transmitter.

The omni-range receiver operates entirely on VHF in the 108 to 136 mc range. It will receive communications, omni-range stations, two-course VHF ranges and phase or tone localizers. An interesting feature from a pilot's standpoint is the fact that with the NA-3 there is no longer any searching for frequency or any tuning to do. Instead, there is a single control consisting of a decade switch reading directly in megacycles.

For example, if you wish to receive the omni-range station at Harrisburg, you look on the charts—its frequency is 112.8 mc. You set the dial to 112.8, not by searching but by definite switch position. Within a few seconds the receiver is definitely on this frequency with very high accuracy because of built-in crystal control (Frequency Selector overhead, not shown in photo).

You can do the same thing for any of the localizer, omni or communication channels on the entire band of 280 channels, every 100 kc apart, from 108.0 to 135.9 mc.

Navigation Info ▶ The navigation information comes the easy way. You merely listen via your headphones when you want either a communication contact or to positively identify the station. All of the information is given you on needles on the Omni-Mag, combining Omni-bearing Selector, cross-pointer Indicator, and Relative-Heading Indicator (see page 61).

There is a third auxiliary instrument to assist you in orienting yourself. This third instrument is known as the Radio Magnetic Indicator (RMI) which gives you the same type of indication you have been accustomed to for some time with ADF.

Why do we need this extra gadget? You may recall that when ADF was first introduced, it rapidly gained acceptance and is now almost a universal navigation instrument in aircraft of any size that fly "all weather." ADF provided position fixing, but even more important, it was easy to use because of its being *heading* sensitive. In other words, when you turned the aircraft, the pointer moved and continued to point to the station.

On the other hand, all position devices such as the aural leg of an LF range, a selected course to or from an omni-range, or a localizer course for an instrument approach are *position* sensitive only. The simplest omni indicator tells you on which bearing you are located, giving you a line of position, but it does not give the direction in which the airplane is headed or flying. To make VOR completely successful for all-weather flying, a *heading* sensitive secondary instrument had to be provided. This is the Radio Magnetic Indicator, which is in effect an ADF on VHF.

Pilot's Report Flight ▶ Having cleared the decks a bit on the instruments, we are now ready for our flight from Baltimore to Detroit. Consider it is a typical summer afternoon, so we can figure on a thunderstorm before we're through.

We lay out a course to follow the omni stations from Baltimore to Phillipsburg to Youngstown to Cleveland to Detroit. Shortly after take-off, we set the frequency selector to 112.8 mc, the omni station at Harrisburg, 80 miles away. The reception is excellent at 3,000 feet. Our magnetic course from Baltimore to Harrisburg as plotted on the map is 352°.

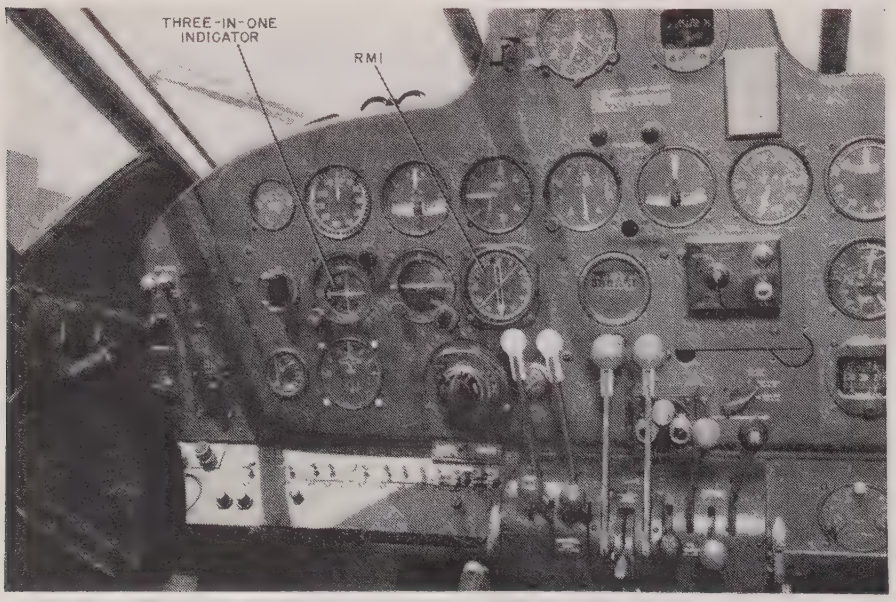
On the Omni-Mag we set the bearing on the Omni-Bearing Selector (at top, marked "Course") to 352° by rotating the knob at the lower left (marked "Set"). The Cross Pointer Indicator "bar" is on the left telling us that our course is to our left and that we must move to the left to approach it. This vertical "bar" course pointer can be visualized as the straight line drawn on your map and as the course to which you want to fly.

On the other hand the short Relative Heading Indicator (looks like the minute hand on a clock) is pointing to the right, saying, "You are headed to the right of your course. Fly left."

Thus we start a turn to the left and continue this turn until the Relative Heading Indicator is aligned with the vertical Cross Pointer Indicator bar. As the vertical pointer begins to move towards the center, we start turning to the right at the proper rate to keep the end of the heading pointer and the course bar aligned. We are on our course very quickly, and we simply have to keep the two pointers aligned until we reach Harrisburg.

A short time after take-off, we find it necessary to climb to 13,000 feet to stay over the overcast. Here we find very heavy atmospheric static. To compare our VHF operation with LF, we

TWIN-BEECH PANEL photo shows Bendix radio equipment Pilot Webb used on flight. Installation is the latest NA-3 VHF transmitting and receiving system and includes omnirange



tune our regular ADF to Harrisburg and watch its operation. It is practically inoperable 75 miles from the station and only begins to point properly about 30 miles from the station. We then switch to straight LF range reception and find we cannot read the Harrisburg LF range at all due to heavy atmospheric static—and we're only 40 miles from it! In fact, we find we can't read it until we are within about 10 miles of it. On quiet days we read it at 90 miles.

We also listen to the identification on the Harrisburg omni-range on the VHF receiver and can hear no static whatsoever. To check communication contacts in the presence of heavy static, we attempt to call Harrisburg on VHF and listen to the reply on LF. It cannot be read. We call again and request them to reply on VHF. The reply is clear and loud with no static.

The flight is continued and we experience similar results on all of the omni stations enroute. Upon arriving over Cleveland, for example, to again test the VHF communication, we called the Detroit omni-range and asked for a reply. The reply came back immediately, loud and clear. We continue to Detroit on an omni bearing and call the Detroit City tower about 40 miles out. They reply immediately on VHF and the contact is completely successful, whereas it was impossible to read their low frequency 278 kc communication.

This flight was enough to give us a taste of the genuine satisfaction of VHF navigation and communication as compared with the old static-ridden LF system. It's quite a relief, too, not to have to listen to that monotonous and tiring voice on the old four-course range.

Survey Shows Radio Equipment in Ships

In order to furnish the CAA with an indication of the number of private flyers whose planes are equipped to utilize the facilities of the Federal Airways System, aircraft owners were asked to specify the types of radio receivers and transmitters installed in their planes. This information is expected to aid in determining the speed with which the purposes of the VHF transition program are being accomplished.

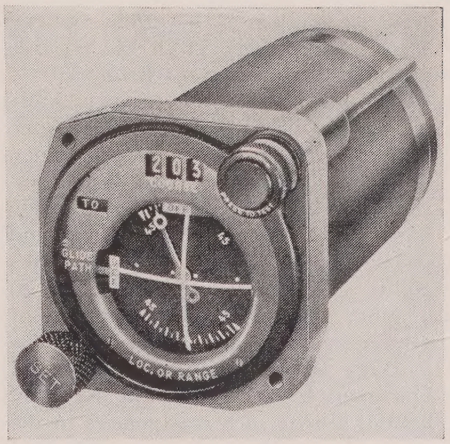
In the multi-engine class, as of the end of 1948, 83 per cent of the smaller models totaling 500-hp or less (mostly Twin Cessnas) had receiver and transmitter, 100 per cent of the medium class (total 501 to 1,000 hp—mostly Twin Beeches and Lockheed 12's), and 95 per cent of the large class (over 1,000 hp) had extensive radio equipment.

In the single-engine plane category, 89 per cent of the three to five-place 145- to 199-hp class, including the *Navion, Bonanza, Voyager* and Cessna 170 had two-way radio, and 1 per cent had receiver only. The figures are fairly similar for the next higher power bracket (200 to 299 hp), which includes the Cessna 190 and 195.

Of the 32,020 aircraft with two-way radios, 26,820 planes, or 84 per cent, had L/MF receivers and HF transmitters.

As the VHF ground installation program got into full swing during 1948-49 and lightweight VHF equipment by RCA, Bendix, ARC, Lear, Narco, etc. became available, the VHF curve began to rise. As of mid-1950 a reasonable estimate would indicate that about 90 per cent of the multi-engine executive type aircraft is equipped with VHF transmitter and receiver. The four-place single-engine class probably will show a very much lower figure for two-way VHF. The standard installation for this category is usually a VHF transmitter and LF receiver.

The time may not be far distant when two-way radio at least will be a "must" for all aircraft which lay any claim at all to utility.



OMNI-MAG is the VHF set's Three-in-One indicator which combines Selector, Indicators

Wilson Radio Company Issues Credit Cards

C. A. Wilson, President of Wilson Radio Company, Fort Worth, Texas, with branches at Municipal Airport, Houston, Texas, and Municipal Airport, Tulsa, Oklahoma, has announced the inauguration of what is believed to be the first aircraft radio credit cards.

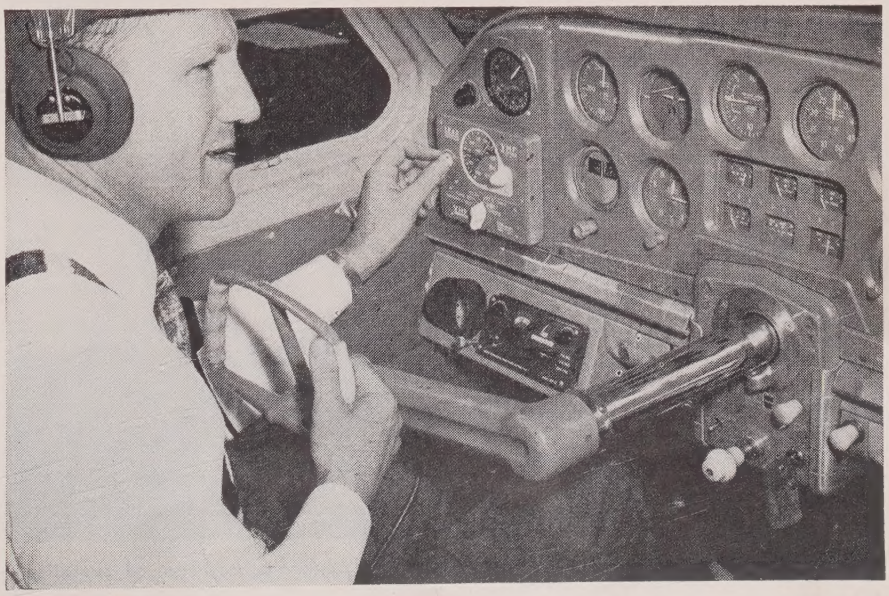
He stated that "these credit cards are good at all three of our 'Heart-of-America' locations, either for radio service or for new equipment. Our customers are located all over, and the idea originated with them, not with us."

Pilot Learns Omni and ADF in 21-Min. Lesson

Charles Soderstrom, who recently flew his *Bonanza* from San Pedro to New York, setting a record (16 hours 12 minutes) in the Class 3 category, decided to have the latest omnirange and automatic direction finding navigational facilities to insure the success of his flight. It took two days for "Salty" Bacon (Bacon Corp., Santa Monica) to install a Lear VHF Omnimatic and Lear ADF-12 Orienter. After exactly 21 minutes of instruction, Soderstrom, who had no previous familiarity with either omnirange or ADF navigation, took off for New York. He arrived 16 hours and 12 minutes later, and remarked as he landed at LaGuardia, "Just like going down a railroad track—only straighter!"

The equipment is shown at left side of panel, VHF receiver-transmitter at top, ADF-12 below, with Omniscope to the left. Price of the Lear VHF Omnimatic System is $595, including the Omniscope, Transmitter-Receiver, Omnipack (power supply), Junction Box, Whip Antenna and Omnitenna (dipole). Cost of the ADF-12 Orienter is $695.

BUSINESSMAN PILOT Charles Soderstrom received 21 minutes' instruction in use of Lear ADF-12 Orienter, then made record-breaking non-stop flight from California to New York



LaGuardia Airport, N. Y. Gets New Field Radar

The first of eight improved Gilfillan airport radar installations has been in operation at LaGuardia Field since the first of June. CAA's Region 1 reports results as highly satisfactory.

Truck-Trailer Out ▶ Noticeable difference in the "new look" at LG is the absence of the old war surplus MPN-4 set with its truck and trailer. Instead, the 10-cm search radar's antenna is housed in a tower, doing away with the shadows formerly encountered on the scopes. The antenna is slotted instead of being solid. This "slotting" permits the antenna to be rotated in much higher winds.

The range-azimuth information obtained from this search radar's constant scanning through 360° is presented on a PPI scope (Plan Position Indicator). Video mapping provides an electronic superposition on the PPI scope of such map-type information as position of radio ranges, compass-locator stations, fan markers, holding patterns, runways, and prominent obstacles.

Echoes Eliminated ▶ This is something added; there is also something taken away: a Moving Target Indicator (MTI), by a clever bit of electronic sleight of hand, eliminates radar returns or echoes from fixed ground targets and materially reduces cloud returns which tend to clutter up scopes and obscure the pips or signals representing aircraft moving within the area. This part of the GCA equipment is now officially known as Airport Surveillance Radar (ASR). Some 49 of these ASR sets are now on order, eight by Gilfillan (1948), 27 by General Electric (1949) and 14 in the recently announced contract to Bendix.

LG Problem ▶ One of the main problems at LaGuardia has been a combination of irregular traffic pattern and a relatively slow landing rate. Radar surveillance should prove of definite help in smoothing out the traffic pattern and increasing the landing rate. By ASR's ability to observe departing flights to a point where elevation separation or divergence in course occurs, the dispatching of aircraft can be speeded up.

Emergency Use ▶ ASR should also prove helpful during such emergencies in the approach-control area as mechanical failure, or any other emergency demanding immediate descent: aircraft lost in the approach pattern; stray aircraft; and expected but unreported aircraft. Radar surveillance can considerably reduce the time in approach-control procedures and very materially increase safety.

The 3-cm precision radar which forms the approach function of GCA has been greatly simplified and improved by its separation from the surveillance function. It is now called Precision Approach Radar (PAR), and one result of this simplification is that a single operator can perform the functions which originally required three operators.

The equipment is housed in a suitable shelter near the runway, and control of all operations is carried out from the PAR Console in the Control Tower.

The Gilfillan contract provided for eight ASR and eight PAR, nearly all of which will be operating by late fall.

INSTALLING airport surveillance radar in tower at LaGuardia has improved operation

Lightweight Airborne Radar Set Ready Soon New Corp. Formed

To meet what seems to be worldwide interest in a lightweight, high resolution airborne radar set, the Allison Radar Sales Corporation has been formed. The President-Treasurer is Aline Rhonie, veteran pilot and active in the original Luscombe airplane development. The corporation, as exclusive manufacturer's distributor and international sales representative for Allison Navigational Radar, has offices at 11 West 42nd St., New York.

Allison Set ▶ A complete story on the set can be told as soon as certain specific Coast Guard tests on an improved prototype model are completed. A check with the airlines indicates that several (both domestic and foreign) are definitely interested in an airborne radar set having the capabilities announced for the Allison equipment. This equipment is the result of six years' development by Donald K. Allison, formerly on the M.I.T. Staff, and Navy Radar Experimental Division, World War II.

It is claimed that at 10,000 feet, cities show up on the PPI scope at 40 miles, mountains at 80 miles, transport aircraft at 20 miles and small aircraft at 5 miles. Navigational fixes may be obtained, obstacles avoided and thunderstorms, sleet, hail, snow and rain can be detected. Radar point-to-point navigation can be accomplished with the ES (gyro stabilized) and ESB (with beacon provision) models.

The TRA 'Transmitter-Receiver-Antenna) unit weighs 46 pounds; the Indicator weighs 10 pounds; cables add two pounds, making a total of just 58 pounds. The ESB model weighs five pounds more. This may be compared with wartime models variously reported as weighing 400 pounds, 200 pounds and about 100 pounds (the last figure being the original specifications for the AN/APS-10 airborne search radar with beacon functions developed by Radiation Lab., Aircraft Radio Laboratories and General Electric—the production job weighed 123 pounds, nearly 200 pounds installed).

When in production (probably during 1951) the Allison radar will be available to operators of multi-engine executive planes, domestic and foreign airlines and the armed services.

Houston Development ▶ The only other airborne radar unit on the immediate horizon is the Houston Corporation's AN/APS-42. The company is located at 11801 West Olympic Blvd., Los Angeles, and the Eastern U.S. engineering representative is J. E. Knaul, 5H-531 East 20th St., New York.

The AN/ part of the AN/APS-42 indicates joint Army-Air-Navy terminology

and that the product may be used by any or all the armed services. As to APS, A is for airborne, P for radar and S for search.

To keep the record straight, before the 42 saw the light of day, Air Materiel Command set up specifications for two experimental airborne radar search sets, one of which was to replace the APS-10 used in Air Force C-54's. This was to be designated AN/APN-59 (N for Navigation). The first was the XA-1, a lightweight unit built by Don Allison, and the other was the XA-2, weighing over 300 pounds, three of which were built by Houston. Both of these sets have been mistakenly identified with the APS-42 project. Bids are now out for a third prototype APN-59, the XA-3.

The Houston APS-42 was developed and produced under BuAer contract, with 331 on order, 218 for Navy and 113 for the Air Force. Ten prototype sets are being built, the first three of which have been delivered and are now under test. The production models will be used in Navy transport aircraft such as R5D (C-54 type) and R4Q (C-119 *Packet* type) of Fleet Logistics Air Wings, and in various types of Air Force military transports. Eventually some production models are expected to be available for the airlines, or multi-engine executive aircraft.

The Houston APS-42 has a total weight of 173 pounds, including Antenna (42 pounds), Synchronizer (40), Radar Receiver-Transmitter (65), Controls (6), Pilot's and Co-pilot's Range-Azimuth Indicators (10 pounds each).

The equipment is capable of four general types of operation—Search, Beacon, Weather and an expanded operation known as Target Discrimination. A brief description of how these functions are handled in an airborne radar set during flight will be given in a forthcoming issue of NAVICOM section.

New Plastic Domes Developed for Omni

The CAA has ordered circular plastic domes to shelter its omnirange antennae from the weather, replacing the square antenna houses now in use on the top of omni towers.

More than 350 omniranges, part of the VHF air-navigation system being installed for use by both civil and military pilots, are now operating across the country. Eventually there will be some 400 stations.

Signals emitted by the omnirange antennae must not be distorted by the housing protecting the antennae elements from the weather. The CAA has determined that polyester resin impregnated glass fiber laminate is an ideal material for this purpose. Its basic advantages are: uniformity of thickness, low moisture absorption and minimum interference with the transmitted signals.

Radio Communication and Navigation Package Engineered for the Cessna 195

Aircraft Radio Corporation engineers are convinced that the postwar trend of allowing new radio instrumentation to grow like Topsy—superimposing the new VHF sets on the old systems used in each aircraft—is wrong. As a result of considerable experience in flying the new omni airways, the A.R.C. men have come up with a finely engineered, integrated radio communication and navigation system for the Cessna Model 195.

Similar to a prototype installation made for the Army in a Cessna 195 (Army LC-126 liaison plane), the combination of equipment is that which was found to be required as a result of over 1,500 hours of single-engine operation by A.R.C. pilots in the past two years. Naturally, this Cessna 195 installation doesn't have everything a pilot might like to have, such as dual ADF or a duplicate omni installation. However, the major objective of A.R.C. engineers was to choose communication and navigation units which would provide a safety factor by "backing up" existing or previously installed communcation receivers, transmitters, and navigational aids wherever possible in the 195, and still keep within a total installed weight of less than 100 pounds.

Equipment Provisions ▶ The proposed Cessna 195 equipment will provide for:

(1) VOR Omni and VAR Navigational aids, backed up by LF range aids plus range and broadcast DF or homing.

(2) Glide Path and Localizer signals for ILS approaches.

(3) Marker Beacon aural reception.

(4) "Simplex" two-way VHF for International emergency on 121.5 mc; airport ground control on 121.7 and 121.9 mc; approach control on 118.3, 118.7, 119.1, 119.5, 119.9 mc.

(5) "Cross-band" two-way VHF for talking to CAA Airways stations on 122.1 mc and receiving on their assigned VHF frequency (usually simultaneous omni); and talking to CAA Tower stations on 122.5 mc and receiving on their assigned VHF frequency.

(6) LF reception on the R-11A Range Receiver from airways stations or towers in case of failure of the airborne VHF receiver or ground VHF transmitter.

(7) Emergency transmission on 121.5, 121.7, 121.9, 122.1, 122.5 mc by means of a second VHF transmitter, powered by a different dynamotor.

Units Used ▶ The individual major units comprising the package, together with their weights, are: (1) Type 15B VHF Navigation Equipment—24 pounds; (2) Type R-11A Range Receiver and L-10 Loop—10.5 pounds; (3) Type R-10A Broadcast Receiver—9 pounds; (4) Type 17 two-way VHF, 10 channels (two transmitters), Receiver covers 108-135 mc—15.8 pounds; (5) Type T-11A Transmitter for emergency duplicate of first transmitter under (4)—3.4 pounds; (6) Marker Beacon Receiver—3 pounds; (7) Glide Path Receiver—13.5 pounds, the last two items war surplus, modified.

This package should greatly assist the Cessna 195 in all-weather flying.

ACC Gives Pilots Demonstration

Air Traffic Control and Navigation Panel show off Transition phase of Common System

Recently the Operational Policy Group of Air Coordinating Committee's Air Traffic Control & Navigation Panel invited representatives of such non-scheduled flying interests as the Corporation Aircraft Owners Association (CAOA), Aircraft Owners & Pilots Association (AOPA), and the Flying Farmers of America to Indianapolis for a full day of discussion and demonstration in connection with the Transition phase of the projected Common System. Cole H. Morrow, Chief Plant Engineer of J. I. Case Company and Chairman of the CAOA Technical Committee, attended and extracts from his brief, informal report follow.

"I attended the Friday meeting of the ATC & Nav Panel and I also got in on the informal session Thursday and became pretty well acquainted with a number of the panel members.

"The Friday meeting was most informative. Commander Wuerker of the Coast Guard is Chairman of the Operational Policy Working Group (OPWG) and he first outlined the organization of the ATC & Navigation Panel, and then gave us the over-all objectives of this working group. In a few words, this appears to be a narrowing down of the SC-31 blueprint requirements to a working level—to put in the operational tolerances, to decide what information will be transmitted when and how often, to decide what information will be placed in front of controllers and in what form, and how they will use it. Also to consider the special problems of each class of user and methods of use of airspace, including problems concerning aircraft which will be only partly equipped with the new gadgets.

Flight Test ▶ "We were then divided into small groups for the purpose of flight and ground demonstrations of some of the equipment CAA has developed. I was lucky enough to be selected to fly in CAA's experimental DC-3 in the demonstrations. Although I was not familiar with the airplane or the navigation equipment aboard, after an explanation lasting about five minutes, I was able to go out and fly a number of navigation problems so easily and simply that I believe any pilot should be able to do the same. These included the use of VOR omni, Distance Measurement Equipment (DME), and the Course-Line Computer, which taken together seem to be the backbone of the new program. VOR and DME told us where we were in relation to an omnirange, including how far away, and the computer made it easy to fly to some point not on a regular omni course. After a while, seeing the stuff was working so well, we tried our darndest to go through maneuvers which would throw things askew, but it came through on the nose every time, no matter what we tried.

Ground Equipment ▶ "We then took part in the demonstration of the ground equipment, especially the Airport Surveillance Radar (ASR), traffic control procedures and equipment for use within the airport tower control area. We did not see anything of the Precision Approach Radar (PAR), as CAA is carrying on the test and development of this apparatus in other locations.

Naviscreen ▶ "The thing that intrigued me most was a feature of the Naviscreen system in which the operator can speed up the locations of the aircraft in the area to determine what the positions will be at any time interval in the immediate future. Thus, if two aircraft are flying an intersecting course at different speeds, it is possible to determine just what the relationship will be at the intersecting point by speeding up the movement on the screen at exactly the same flight speeds that they are maintaining.

"It was interesting to me to see practically no reference to ILS in future plans of this Working Group. Nearly all the attention is being directed toward the use of VOR, DME and R-Theta off-course computer for navigation along the new-type airways, and ASR and PAR at the air terminals.

"ASR picks up the flight about 40 miles out, and according to the experience of the USAF All-Weather Flying Division at Wright-Patterson, this equipment can be used entirely for PPI approaches down to ceilings of 200 feet and one-half mile. Below this, PAR is required and apparently safe landings can be made down to zero-zero.

Pilots Report ▶ "During the informal discussion period and in talks I had with a number of pilots afterward, it seems that a good deal of scepticism has developed with regard to this common system. A lot of them seem to think that tremendous quantities of expensive airborne equipment will be required in the future, and that practically nobody except the scheduled airlines will be able to use the facilities. From talks I had with Sam Saint and other members of the panel, I think when they get everything rolling, just the reverse will be true. I also think we have quite a lot of educating to do.

"This scepticism is probably a natural reaction by people who do not know as yet enough about what the Group is doing, and do not have the necessary imagination to picture and evaluate operations in the near future based on an entirely different traffic control plan than has been in use in the past. It's only human nature to try to fit the new problem into the picture that we are familiar with in using old and limited equipment. In other words, it takes quite a step of imagination to contemplate instrument approaches at 40 per hour at 200 feet and one-half mile visibility under present circumstances.

"I think this Working Group, the ATC & Nav Panel and the various elements of RTCA are all to be complimented on taking an entirely new and fresh viewpoint in working out their objectives completely unhampered by present viewpoints and equipment limitations."

IATA Thrashes Out U. S. Air Traffic Problems

How to get airplanes in and out of airports, on time, in all weathers and with a minimum of fuss and a maximum of efficiency was the outstanding problem discussed at the recent IATA Technical Conference in Asbury Park.

The findings were of interest to pilots of multi-engine executive aircraft, many of whom hold air transport carrier ratings.

An important result was agreement on specifications for Type A (low-intensity) and Type B (high-intensity) approach lights. Necessary adjuncts to approach lights were stated to include adequate threshold lights, easily distinguishable runway markings, and clearly defined runway centerline and edge markings.

A permanent subcommitte was established to further analyze pilot reactions while making very low approaches (about 100 feet and one-eighth of a mile). Its job is to establish how accurate cockpit instrumentation has to be and how precisely the pilot must react to achieve maximum instrument landing safety and to reduce bad weather landing intervals.

Navigational Science

Dr. Paul Rosenberg, recently elected president of the Institute of Navigation, stated at the Sixth Annual Meeting of the ION that navigational science has recently become a vital factor in our military preparations for national defense.

"In the air, military aircraft encounter many vital navigation problems in all-weather flying, in traffic control, in pin point bombing and in air defense, to mention but a few situations."

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